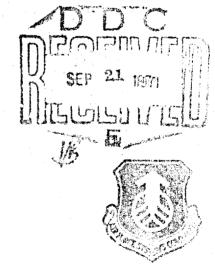
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United States Air Force

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Bibliography, With Abstracts, of AFCRL Publications From 1 January to 31 March 1971

INTRODUCTION

This bibliography lists all AFCRL in-house reports, journal articles, and contractor reports issued during the reporting period. The DD Form 1473 (Document Control Data - R&D) for each publication is included.

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scintillations takes place between 2100 and 2400 local time during the equinoxes; a minimum occurrence is observed during the solstices. When the sunspot numbe decreases, the equatorial irregularity region spreads and becomes larger. The data for various latitudes has been placed in statistical form, that is, distribution of amplitudes for 15-min samples as well as for periods of 1 yr and longer. To minimize the effect of this ionospheric phenomenon on satellite transmissions, the sustant designed and the substantial distribution of amplitudes for the substantial distribution of a statistical form. the system designer can utilize amplitude distributions, fading rates, depths, and other aspects of scintillation observations in designing his modulation. KEYWORDS: Global morphology, Ionospheric scintillations, Satellite communications. Navigation systems

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13. ABSTRACT Knowledge and unde	rstanding o	f the propagat	ion of	electromagnetic
waves through the ionosphere	, ionospher	ic irregularit	ies, ar	nd artificial electron
clouds, provide the information of discrimination, detection,				
distribution changes during es				
change affects the scattering	characteris	tics of the clo	oud.	
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scatter characteristics of sph crease with distance from the				
(3) an inverse-square decreas				
the inverse square distributio	n is always	larger than f	or the	other two distribu-
tions. As the center point den				
tained with the gaussian sphere conducting sphere, that of the	re most rap	naly takes on	une cha sliøh+1∘	racteristics of a but that of
the inverse-square sphere ne	ver gets clo	ose to the res	ult for	a conducting
sphere. In forward scatter, t	he inverse-	square distril	bution	shows the largest
cross section and a fairly rapid increase with center point density, the $sech^2$ distribution has an essentially constant cross section, and the gaussian, which				
has the lowest forward scatte	r cross ser	tion shows a	and the slight	decrease with
center point density.			or Bur	GUGIUNDE WIGH
KEYWORDS: Scattering, Geometric optics, Radio frequency,				
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Acoustic-gravity wa reflecting surfaces. Ove	rhead passage	of such surface	es caus	es variations of	
amplitude, phase, and fr these variations change					
the study and prediction	of these pattern	ns, computer e	xperin	nents were carried	
out ot simulate the effect radio waves. The simul					
and its derivative. The	results are cor	npared with hig	gh-free	uency measure-	
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This paper deals with t casting during both disturbe	ne use of rio d and undistr	meters as an a whed condition		onospheric fore-	
regions of the earth. Both	the physical	and technical a	spects	s of riometry are	
discussed. Riometer observations during special solar geophysical events					
such as polar cap absorptions, auroral absorptions, and solar flare effects					
are presented and discussed. Suggestions for the improvement of riometer					
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as integral part of forecasti	ing systems a	ire presented.			
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KEYWORDS: Riometry, Ionospheric absorption, Polar cap absorption events, Auroral absorption, Solar flare effects

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13. ABSTRACT Optical observations following the main	Laboratories, L.G. Hanscom	bridge , (LK) Field	Research C)
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can be described in terms of three phases second, is the initial release and expansion second is the ionization phase that can tak release altitude and size. The remaining development of striations in the ion cloud clouds. Observations of each of the above pha showed the ionization mechanism to be via were conducted which led to a more detail volved.	ton of a neutral ke from 3 to 10 g history is cha and of a tail jo ases with vario	bariu bariu 0 sec, racter pining us opt	of the order of a m cloud. The depending on rized by the the ion and neutral ical instruments
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The coupled equations representing the horizontal neutral air winds arising from the diurnal variation of atmospheric pressure, are solved numerically. Taking full account of the diurnal and seasonal variation of electron density, meridional and zonal winds have been computed at mid-latitudes for both solar maximum and solar minimum conditions. The daily variation of both the meridional and zonal wind can be well represented by a daily mean plus a 24- and 12-hour oscillation and tabular values of the winds for each season are given for the height of the F2 maximum and for every 100 km interval from 200 to 500 km. These values can be used to readily compute the associated vertical drift velocity at any middle latitude location when account is taken of the local geomagnetic field.				
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Crystals of high chemical and mechanical perfection are required for research in electronic devices. The purpose of the research reported here was to produce diamonds for use in the fabrication of semiconducting devices. This was one portion of a laboratory-wide program investigating the utilization of diamond as a high temperature semiconductor. Diamond synthesis is explained in terms of crystallization from a super- saturated liquid. The major driving force is thermodynamic. The primary condition for synthesis is a stable diamond-liquid equilibrium in which the liquid is composed of carbon and certain metal solvents. Thermodynamic expressions are developed for describing the pertinent portions of the nickel-, cobalt-, manganese-, and iron-carbon binary systems. Temperature- composition diagrams at high pressures are drawn to show stability relationships and the allowed limits for synthesis. The theoretical model is verified by an exten- sive ultra-high pressure-temperature experimental investigation. Theoretical and empirical results are employed in predicting conditions for producing high quality single crystals.					
KEYWORDS: Diamond synthesis, High pressure thermodynamics, Metal-carbon systems, Semiconducting diamond, Boron active impurity					
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A mathematical filter fo is proposed and discuss	r eliminating ed. This filte	persistence in r r takes the form	meteo: n	rological data
z	$t = X_t - \rho_1 X_{t-1}$	1 [.]		
Relationships between statistical parameters of the filtered and the original data are derived and found to depend only on the value of ρ_1 . Examples of the effect of the filter on the power spectrum of various types of input data are also given.				
KEYWORDS: Persistence, Meteorological data analysis, Mathematical filters, Markov processes				
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13. AUSTRACT					
A technique that utilizes a reference signal of varying phase for measuring the phase of millimeter signals in free space is described. The phase of the reference signal is measured independently and subtracted from the total phase measured to determine the desired phase. The use of a varying reference phase is necessary because flexible or movable waveguides whose phase characteristics can readily be measured are not available at millimeter wavelengths. The theory of the technique described is based upon the interference pattern of slowly vary- ing electric fields.					
KEYWORDS: Millin Interference pattern	neter wavelen	gths, Phase	mea	surements,	
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13. ABSTRACT					
The need for high- ceramic materials for study of various titanat we have developed a m of 530 ppm/°C and a di Lava T-96 Ceramic, bu firing, and aging of cer techniques, are presen These results may be v of zero temperature co	microwave-dev te and oxide min aterial which ha ielectric constant ut has a higher ramic materials ted and results valuable to work	ice application ctures. In the c as a temperatur nt of 106, compa dielectric const , as well as mic are given in gra ters wishing to	has gi ourse e freq arable ant. I crowa aphic	iven impetus to the of this research uency coefficient to the American Methods for mixing ve measurement form and tables.	
KEYWORDS: Dielect ceramics, Tempera	tric resonatc ture coeffici	ors, High die ent, Temper	electi atur	ric constant e stability	
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13. AØSTRACT		I			
Self-orthogonal codes have been used on many occasions due to their added ease of decoding. In particular, moderate length self-orthogonal codes are often needed. This paper gives a complete listing of all self-orthogonal codes of rate one-half whose length is between 2 and 18, and also lists all their properties. Someone who wants to use such a code can see what is available from the list and then select one based on the characteristics listed.					
KEYWORDS: Self-orthogonal codes over GS(2), Complete group of codes, Equivalent classes, Weight distribution					
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 ABSTRACT To improve the reliabil decoder was designed, correction capabilities a random error-correc The code is in the class offs between failsafe co discussed is a special of procedures used for con originated and first rep Force Cambridge Resea KEYWORDS: Failsa 	constructed, an under stationar ting (73,45) cyc of difference s mmunication an hreshold detect ief description mputer evaluatio orted by C. F. arch Laboratory	inmunications d evaluated for y gaussian nois lic code in a b et cyclic codes d efficiency of ion technique f of the experim on. The work Hobbs (now de y Summary Rep	system r failsa se cond inary e s. Dis tra.isr or erro ental s is an e ceased port.	is, an encoder/ fe and error litions. It employs crasure channel. cussed are trade- nission rate. Also or correction pur- system and the extension of that
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A new method for counteracting the damping effects of interpolation makes use of simple symmetric linear filters. Specifically for use in numerical integrations involving multiple mappings of a grid network on a sphere, it has been designed to take advantage of the relative simplicity of map representations in numerical integrations and at the same time avoid the instability that is due to incompatible solutions in the overlap region. Whether or not the method will actually succeed in this purpose can only be determined from specific experi- ments. The method makes use of linear filtering to produce a maximum restoration of damped amplitude, and may therefore also be useful in generating initial grid point data from irregularly spaced station data as part of some general objective analysis procedure. The procedures are general and may find application in such diverse problems as that of incor- porating nonsynoptic data into an objective analysis procedure or in limited- area nesting problems. KEYWORDS: Interpolation, Filter, Amplitude restoration, Damping, Stability, Phase displacement						
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This paper was originally submitted in partial fulfillment of the requirement for the Degree of Master of Science in	Air Force Ca Laboratorie L. G. Hanscon	es (LR) m Field		
electrical engineering from MIT.	Bedford, Mas	sacnuse		
13. ABSTRACT There are many potential applications for the user to be able to communicate with	n the machine in	English.	A number of ex-	
perimental computer programs have been a capability of accepting input in at least a re programs have been fairly successful at un questions on some specific topic. None, ho date base and none can deal with contents	estricted subset of derstanding and a wever, can deal	of Englis answerin with more	h. Some of these ng simply phrased re than one type of	
data base, and none can deal with sentences The theory of transformational gramm rate attempt to date to formalize the syntac analyzing a sentence according to a transfo	ars represents t tic structure of rmational gramm	he lingui English, ner is a	ists' most elabo- The result of so-called "deep	
structure," which expresses various information about the constituent portions of the sentence in a treelike form. In view of the relatively high state of development of the transformational theory, it is natural to use it as the basis for the "front end" of an				
English-understanding program. The system discussed in this report provides a general method of interpretation of transformationally parsed sentences for use in question-answering. It is based on a general scheme for using the information contained in the deep structures to interro-				
gate a data base. The primary effort is aimed at handling a wide variety of complex syntactic structures, with particular concern for the problem of embedded structures. The system provides a general facility for handling syntactic structures, to which				
a user can add routines corresponding to the wants to use. The present implementation	ne specific nouns, includes a vocabi	, verbs, ularv su	and adjectives he Itable for dealing	
with sets; the noun, verb, and adjective rou about 10% of the entire program. KEYWC Computers, Man-machine interac	ORDS: Trans tion, Semanti	forma cs, Na	tional grammar, tural language	

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13. ABSTRACT	┛			
This Bulletin is a quarterly publicatiot contains AFCRL contract and inhouse data reported from sites throughout the world. The first four issues, which encompassed 1964 data, constitute Volume I. Volume II (numbers 1-4) contains quarterly data for 1965 with Volume III (1966), Volume IV (1967), Volume V (1968), Volume VI (1969), and Volume VII (1970). Program descriptions for all data sections are updated annually or as required, and are presented in Number 1 of each volume. The following types of data are contained within each issue: magnetometer, cosmic ray, ELF noise, riometer, solar optical and radio emission, and ionosonde. This issue covers such data for July, August, and September 1970.				
KEYWORDS: Magnetometer, Neutron monitor, ELF noise, Riometer, Solar optical observations, Solar radio emission, Vertical incidence ionospheric soundings				
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13. ABSTRACT		•			
The L.G. Hanscom Field S&E Awards Meeting, held in the Base Theatre on 3 November 1970, served as the vehicle for recognizing selected outstanding research performed by scientists of the Air Force Cambridge Research Laboratories and those of the Electronic Systems Division. This volume is the collection of eight AFCRL papers (three were jointly authored), and two papers prepared by researchers of the ESD, given at this Meeting. The S&E Awards Meeting was also the forum for informing the RDT&E communities at L.G. Hanscom Field of the significant research completed or continuing in a number of disciplines by scientists of the AFCRL/ESD organizations.					
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No. 2. Postscript 1970 by P.P. Ewald	Laboratories	• •	
KEYWORDS: Dispersion theory, Reflection, Refraction	L.G. Hanscom Fiel Bedford, Massachu		0
13. ABSTRACT This two part paper investigates the propagation of light in the vi	sible region through a c	ystalline n	vedium.
In Part I, which is a slightly shortened version of the author' anisotropic arrangement of ordinary (isotropic) dipoles at the existence of double refraction. The value of the computed bin Additionally some features of the traditional "theory of dis "incident optical wave" plays a role but it is shown that in a n should be assumed: The refractivity is shown to arise as an intern	s doctoral thesis of 19 nodal points of an orthore refringence is found to persion" are disclosed a redium which extends t al property of the media	12, the ob orhombic l be compa and clarifie o infinity i am.	jective is to determine if the attice would account for the arable to the observed value. Ed. In the older theories the in all directions no such wave
In Part II, a crystalline medium is considered as filling a half-spa incident on this medium. Because of the linearity of the equi crystal. It is shown that this incident optical wave is actually pr produced in the field of the crystal by the introduction of a bo boundary. The higher their order, the more rapidly they attenu zero order waves are ordinary undampted plane waves of vacu connected by the Fresnel formulae: These follow from the	ations it has to be super revented from entering undary. Boundary wave ate as a function of dis aum velocity c. The fie	imposed o the crystal s are found tance away lds outside	n the field originating in the because of the modification to exist on both sides of the from the boundary but the e and inside the medium are

Material Added 1970. The conclusion that the incident optical field cannot penetrate the crystal boundary, together with a similar conclusion in a paper by Oseen, is the basis of the Ewald-Oseen Extinction Theorem.

The same methods and field transformations developed in this two part paper were applied in two later papers which were published as Parts III and IV. These extend the treatment to the passage of X-rays through crystals. "Postscripi. 1970" published here indicates the relationship of these four parts and further developments of the subject as well as referencing the papers noted above.

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KEYWORDS: Ion-molecule reactions, Bimolecular reactions, Charge transfer reaction				
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13. ABSTRACT			····	
Single-crystal mater electronics are reviewed characteristics of crystal optic crystals, and ultras present status of crystal tions between the growth stressed. The necessary analyzed, and some impo domain structure in oxide pointed out. Some theore for materials scientists a	from the viewp l-line laser hos sonic light diffra growth by the p conditions and o y steps in the pr ortant factors su e ferro-electric etical treatment	oint of mater ts, nonlinear action solid n ulling method defects in the occess of dev ich as phase s, and laser	ials scie optic con nedia ar l is disc obtaine ice fabri diagram damage	ence. The rystals, electro- e described. The ussed, and rela- d crystals are ication are information, susceptibility are
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13. ABSTRACT		<u> </u>	
This report describes the theory, detai prototype of a small-scale Fourier spec spectral intensity of the radiation from 10 to 40 μ range from aircraft, balloon Notes that the second second second second second KEYWORDS: Infrared, Fourier	ctrometer to m the Earth or o s, rockets or s	easure ther pla atellite	the absolute inets in the
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^{13.} ABSTRACT Earlier studies of ionospheric boundary of the high-latitude region when observed. The quiet-day scintillation bou invariant latitude at 2200 LT. Dyson's (Langmuir probe have verified the exister scale irregularities. The boundary conce of magnetic storms. Observations of sat during 1961 to 1966 indicate that the mea of the irregularity region is a decrease of local K index. This is quite similar to the noted for the trough position by Rycroft a data available from high-inclination and the change in latitude with K index is a fi latitude as a function of K index, approxis between 0300 and 0600 LT; the minimum over a broad interval from 1600 to 0200 produced by an interaction of the plasma logic behavior of this region of the magn the large inventory of scintillation and s the course of ionospheric research. KEYWORDS: Sub-auroral ionosphere, Io boundary, Magnetic activity, UHF/VHF	re intense scir undary reache 1969) recent of the of a lower ept has been e ellite beacon s in change in the of approximate the change of 1. and Thomas (1 synchronous s unction of time imately 2 ⁰ to 3 change, about LT. If the irr pause with the etosphere can pread F data to nospheric irre	ntillation d a low bserva latitud xtended signals e lowe e lowe e lowe e lowe for per t 10 per t 10 per ionosp be stuu hat has	ons at 40 MHz were ver position of 57° tions with a le boundary of small- d to include the effect at 40 and 54 MHz r boundary latitude oper unit change in unit change in Kp in examining the es, it was noted that maximum change of unit K, occurred r unit K, occurred ty structure is ohere, the morpho- died by reviewing s been amassed in	

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13. ABSTRACT				
High altitude che of the intense backgro emission line detecto interference filter in successful field test a	ound light of the sk rs is given. An ins a differential radio	y. A comparis strument incorr	son of s poratin	g an ultra-narrow
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	•	Bedford, Mas		
13. ABSTRACT		· .		
The Flying Ionospher	ic Laboratory,	a NKC-135 jet	aircra	Ift of the Air Force
Cambridge Research Lab	oratories, mad	e during the wi	nter of	1969-1970 four
flights which examined th				
around the oval; two cove				
camera photographs taken oval, defined as the band	of visible auror	ral arcs, is une	der mo	derately disturbed
magnetic conditions (ΣK_n				
Under quiet conditions (2	K_<10) disconti	nuities in the o	ccurre	nce of au: ra in the
oval were observed in the	morning, noon	, and evening :	sector.	Discontinuities in
the morning sector were			ntinuitie	es in the noon and
evening sector could be e	itter temporal	or spatial.		
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KEYWORDS: Auroral ova	l, Continuity of	auroral forms	, Magn	etospheric model
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13. ABSTRACT	l					
13. ADSTRACT						
A study of 19-GHz (1.58-cm) solar radio bursts recorded at the Slough Solar Radio Observatory from July 1967 to June 1969 suggests that they can be used as reliable indicators of proton events and of PCA's provided that (a) the peak flux increase during the burst is >50% of the pre-burst values, and (b) that the flux enhancement is >10% for longer than 5 min. The warning period, from the time of the burst to the arrival of the first detectable protons in the vicinity of the earth, ranges from tens of minutes to several hours. There is a further delay of three or more hours to the time of maximum proton flux. Since only one frequency is involved, a proton warning solar radiometer could be fitted to any aeroplane, satellite, or spacecraft to supplement ground observations.						
KEYWORDS: 19 GHz, Solar radio bursts, Proton event indicators, Burst duration						

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Vol.7, pp.133-135.	L.G. Hanscon			
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13. ABSTRACT	J			
The total energy in fixed-frequency solar microwave bursts that exceed certain threshold values, when normalized in terms of the peak intensity of the burst, is a much better guide to the intensity of associated solar proton fluxes than either the peak burst intensity itself or the total, un-normalized, energy produced in the burst.				
KEYWORDS: Solar microwave bursts, Solar protons, Sc ar forescasting, Solar radio spectra				
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pp.911-915, December 1970.	L.G. Hanscor				
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13. ABSTRACT					
The mean motion of particles in a thunderstorm anvil has been measured at various heights and elevation angles by Doppler radar, using the velocity- azimuth scanning mode of Lhermitte and Atlas with the harmonic analysis scheme of Browning and Wexler. An error analysis indicated that the measurement accuracy, even at elevation angles as high as 80°, is comparable to the inherent radar resolution of 0.9° in direction and 0.6m sec ⁻¹ in speed. The scale of temporal and spatial variability of wind at anv ⁻¹ height was more than an order of magnitude greater than the errors; consequently, the measurements of anvil winds obtained by Doppler radar are considered to be significantly informative. Estimates of divergence, on the other hand, were quite unreliable at elevation angles >50° and not especially trustworthy at any of the smaller elevation angles. All measurements of divergence, however, showed a trend of increase with greater height in the anvil. Pronounced anomalies in the measured wind com- ponents, with respect to the components required by the mean anvil flow, provide a rough map of the intense, upper level outflow of the thunderstorn.					
KEYWORDS: Dopple adar, Thundersto Divergence measurement DD roam 1473	erm anvil, Win	d meas	surement,		

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13. ABSTRACT	.*		······································		
The band strengths of the Cameron system of CO, $\alpha^3 \Pi \rightarrow X^1 \Sigma$, have been measured. The data yield an electronic oscillator strength of $1.7 \times 10^{-4} \pm 10$ percent. The radiative lifetime depends on the rotational quantum number and estimates are made of these from published line strength formulae.					
KEYWORDS: Spectroscopy, Oscillator-s	trength, Carbo	on mon	oxide, absorption		

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Bedford, Massachusetts 01730 ^{13. ABSTRACT} We simultaneously measured atmospheric emission and absorption under clear sky conditions at frequencies of 15 and 35 GHz and compared the values with those calculated from the radiative transfer equation. The measurements show that atmospheric attenuation determined from emission and absorption measurements agree within experimental error and that the calculated values of attenuation agree with the measurements on a statistical basis when the Gross form factor is used with the model of a plane stratified atmosphere.						
KEYWORDS: Millimeter waves, Atmosph	eric attenuati	on				
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15 November 1970.	Laborato					
	Bedford, Ma					
13. ABSTRACT						
A study of p-type silicon shows that (1) the annealing temperature of electron-irradiation damage increases as the acceptor concentration increases and (2) the isochronal annealing behavior of damage in samples with gallium and aluminum impurities is different from that in boron-containing samples, which show a higher annealing temperature.						
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M. H. Manghnani						
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Gerlich has shown that Sheard's n	odel for calcula	ting m	ada al a fram			
hydrostatic pressure derivatives of the	e elastic moduli	of hen	Mg and Cd vields			
Gruneisen γ 's at both high and low tem						
the γ 's derived from thermal-expansion	n measurements	s. For	hcp Ti and Zr,			
however, large differences arise, prin	marily from ver	y smal	l values for			
dC44/dP. It is proposed that these sn c/a ratio with hydrostatic pressure be						
c/a ratio. The disagreement with the	rmal-expansion	data ca	in be removed by			
c/a ratio. The disagreement with thermal-expansion data can be removed by taking into account the difference in $d(c/a)/dV$ between hydrostatic-pressure and						
thermal-expansion conditions. The eff	ect of $\Delta(c/a)$ is	not fou	ind in tetragonal			
TiO ₂ , rutile, where $\overline{\gamma}$ H is in excellent	agreement with	the the	ermal expansion γ∞.			
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The photoactivity of active bacteriochlorophyll and the absorption spectrum of bacteriochlorophyll absorbing at 800 nm are temporarily lost at low pH but partially regenerated by increasing the pH within a certain time limit. This pH-induced modification and regeneration of these bacteriochlorophyll molecules indicate the contribution of protein conformation in their environment to their spectral and photoactivity characteristics.					
KEYWORDS: Absorption spectrum, Photoactivity, Bacteriochlorophyll, Bacteriopheophytin, Protein convermation					
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13. ABSTRACT					
Nitric oxide has been expanded from a high-pressure reservoir against a					
supersonic stream of hydrogen atoms in an inert carrier. A chemiluminous headglow was observed in which the emission intensity exceeded by three orders					
neadgrow was observed in w	f the offered	The energy	exceed	ed by three orders	
of magnitude the intensity of	i the atterglow	. The spectr	um con	sists of the	
of magnitude the intensity of the afterglow. The spectrum consists of the vibronic bands of the $A^{\#} - A^{\dagger}$ transition.					

KEYWORDS: Chemiluminescence, HNO, Atomic oxygen, Nitric oxide

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Measurements of sola	ar extreme ultr	aviolet radiation	n in th	e wavelength
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over a solar rotation peri	od was obtained	for emission li	ines r	epresenting
elements in various stage	s of ionization.	Since no correct	ction r	need be made for
atmospheric absorption, t of the results we previous				
rocket vehicles.	-,			
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KEYWORDS: Gas voltage breakdown, Upper and lower rounds on eigenvalues of Hermitian operators DD FORM 1473	of Hermitian operator	age breakdown, Uj rs	pper and lower	r round	s on eigenvalues

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13. ABSTRACT
The vaporization of $Na_2O(c)$ has been studied mass spectrometrically. It
was found that the vaporization yields primarily $Na(g)$ and $O_2(g)$, with $NaO(g)$
and $Na_2O(g)$ being minor vapor constituents. From equilibria involving
$Na_2O(c)$, $Na_2O(g)$, $Na(g)$, $NaO(g)$, and $O_2(g)$, it was possible to measure
$\Delta Hf_{298}^{O}[NaO(g)] = 24.3\pm4$ kcal/mol and $\Delta Hf_{298}^{O}[Na_2O(g)] = -9.9\pm3$ kcal/mol.
These values yield $D_0^{O}(NaO) = 60.3\pm4 \text{ kcal/mol} (2.61\pm0.20 \text{ eV}) \text{ and } D_0^{O}(Na_2O) =$
119, 8±3 kcal/mol (5.20±0.15 eV). The appearance potentials of NaO ^{$+$ and}
$Na_{0}O^{+}$ were measured and found to be 6.5±0.7 and 5.5±0.5 eV, respectively.
These appearance potentials are suggested to be close to the true ionization
potentials of the molecules. Implications of these results regarding some
recent beam experiments are briefly discussed.
KEYWORDS: Dissociation energies, Mass spectrometry, Ionization potentials,
Sodium exide. Thermochemistry
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13. ABSTRACT				
A Two-step ionizati mechanism to the comm ionic meteor spectra. A this mechanism is expec- calculated in a slip-flow collisions of atmospheri are taken into account. model is then applied sp which are enhanced by t	nonly accepted dir near-resonance cted to predomina "threshold" app ic molecules as w Qualitative agree pecifically to the	ect-excitation criterion is in the. The impli roximation. T cell as first co ment with obs example of the	one fo nvoked cations hat is, ollision ervation bright	or the generation of to indicate when s of the model are first and second s of vapor atoms ons is obtained. The t Ca II spectra,
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13. ABSTRACT The spectral dependency and polariz scattered from polydisperse distributions cold chamber. Within the limits of experiment acc spectral variation in the shape of the sca small but discernable, having a negative	s of ice crystal curacy, there v ttering diagran	s grow vas no n. The	n in a laboratory discernable e polarization was
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A mechanism is pr and environs of Fairbar size distribution result tions are numerically s sources: (1) automobile water. The size distri- the cooling rate of wate a function of the source posed mechanism adeq cooling rate cf the wate (source types 2 and 3). injected into the atmos source is not adequatel tions, the computationa particles with decreasi	nks, Alaska. Equa ing from growth b solved with a comp e exhaust, (2) exha bution produced b er vapor injected i e characteristics of uately represents er vapor injected i Because of the la phere by source to y represented by al results predict	ations are deve by deposition of puter for three aust from heat y an individual into the enviro and the ambien the observed s into the enviro orge cooling ra ype 1, the size the model. In a decrease in	eloped a f water major ing plat sourc nment, size dis size dis ite of the distril agreen the siz	for calculating the vapor. The equa- types of ice fog nts, and (3) open e is determined by The cooling rate is erature. The pro- stribution if the is not too large ne water vapor bution from this pent with observa- e of ice fog
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Photoionization of th important source of ioni is from 1027 to 1118 A, incident solar flux but is production rates based of tion cross sections and r Recent solar flux measu of 5. This reduction is p Si III multiplet, which is section = 4.4×10^{-21} cm generally larger than the previously considered is absorption cross section level mixing ratio has be than Hunten and McElroy production rate of 1 ion for zenith angles of 0°, rate to be 10 to 15 km lo angle of 45° for a variet atmosphere with 5 ppm KEYWORDS: Photoionize	vation in the D r where ground st is not ionized itse on new laborator more detailed cu- rements reduce partly compensat is at the deepest (1^{2}) and by the ne- e previously ass is absorption by co- in than ground state een assumed. The y's [1968] curve cm ⁻³ sec ⁻¹ is r 45 ^o , and 60 ^o , re- wer. Concentration y of conditions, H ₂ O.	egion. The wa ate O_2 is the p lf. This paper y data, includi rves in severa the continum i ed by including O_2 window (110 w ionization cr urned values. J arbon dioxide, te O_2 througho te ion producti s if CO_2 is not eached at appr espectively. The ions of O_2^2 are including a dry	velength primary presen ng new all groun ntensity g in the 08.2 A, coss sec An impo which but this on rate: include oximate unten ar e calcula y atmos	h region of interest b absorber of the its improved ion $O_2(1\Delta_g)$ photoionizated ad state O_2 windows. by about a factor calculations the minimum cross etions, which are portant factor not has a much larger region. The ground s are somewhat less ed. With CO ₂ , a ely 80, 04, and 86kr and McElroy find this ated for a zeni.h
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13. ABSTRACT				
A device for selecting and alternately focussing optical mechanical chopp	g them on the sam	me detect <mark>or</mark> el	lescope ement	e image plane, by means of an
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KEYWORDS: Two-spot-	-	-	device,	, Celestial-targets,
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I find that a one- until the Mach number	dimensional strong	coronal shock	k (M _S >: aight Ta	3; will grow outward Ma(db=0) The shock
is driven by the press	sure gradient and it	t is damped by	v gravit	v and by energy
losses (radiative and	conductive). The d	riving and dai	mping te	erms reach
equilibrium for $M_s \simeq$	4.	N ~ 4 1 1 4	4 _	.))
in the corona in the r	imp conditions for angle 10 ⁷ to 1 8×10	$V_{\rm IS} = 4$ lead to	ion mea	shock temperatures
3.8×10^{47} to 3.8×10^{47}	⁸ cm ⁻³ . For isola	ted simple ev	ents, I	predict an exponen-
tial decay of the emis	sion measure with	decay times i	in the ra	ange $1 < \tau < 6.5$ min.
In a detailed stud	y of over 4000 X -r	ay bursts, Dr	ake (19 a (the 't	hermal [†] component)
1 to 6 keV X-ray data and finds ranges for t	he temperatures of	$f 1.2 \times 10^7$ to	1.8×10) ⁷ K, for the
emission measures o	f 5.1 \times 1047 to 3.8 \times	1048 cm ⁻³ an	d for th	e decay times
$0.5 \le \tau \le 20$ min. He event to event and with				
The agreement b	etween the predicti	ons and the ol	oservati	ions makes it appear
that a strong shock in	i the corona will pr	oduce a post-	shock s	tate that yields the
observed characteris X-rays).	ues of the soft com	ponent of X-r	ay ours	as the 'nermal'
I give several ex	amples where spra	ys and fast er	uptive p	prominences(M≃ 1),
that are not associate bursts. There were t	d with solar flares	, are associa	ted with	thermal'X-ray
<u>neither of them vield</u>	ed a detectable X-r	av burst.	<u> </u>	in the sample, and
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H α DOPPLER BRIGHTENING AND LYMA MOVING H α PROMINENCES	N-a DOPPLE	r dimn	ING IN	
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Bruce W. Lites				
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pp. 147-156, 1970.	Laborator			
pp.141-130, 1370.		· · · ·		
	L.G. Hansco			
	Bedford, Mas	ssachus		
13. ABSTRACT				
We consider the effect that coherent	motion has on	the obs	served brightness	
of moving clouds above the photosphere.	We find that s	teady s	tate clouds (constant	
N_e and T_e) that are moving perpendicular	to the line of	ciant u	will appear brighter	
in H α for speeds between 8 and 100 km/s	ec and dimmer	for cr	and appear originer	
135 km/sec. The brightening and dimmin	a and duminer	non sp	Dopplop chifts of	
the accretive He abcomption and the Law	g are due to a	pparent	boppier shifts of	
the respective H α absorption and the Lym	an-a emission	i prom	es 'seen' by the	
absorption profile of the moving cloud.		,		
We apply this analysis, along with or	fical depth and	d geom	etrical considera-	
tions, to the observed brightness variation	ons of the 1 Ma	irch 19	69 limb eruptive	
prominence. We find that all of the observed brightening and dimming can be				
explained by the motions, and that no sig				
T_{o} was necessary during the observed Ha	event This c	າດກາງກອ	ion is significant in	

 T_e was necessary during the observed $H\alpha$ event. This conclusion is significant in interpreting and X-ray burst that began as the prominence velocity increased abruptly at the time of maximum $H\alpha$ intensity. The 'thermal X-ray' peak occurred 150 sec later when the prominence had become faint again. There was no associated flare that was visible in $H\alpha$. We discuss the relative brightness of $H\alpha$ and D₃ in a specific moving prominence knot. We note that the observed range of limb speeds (30-150 km/sec) may be due to the combined $H\alpha$ Doppler brightening and Lyman- α dimming effects. We also discuss generally the $H\alpha$ brightness of disk surges (bright and dark) and flares, and snraws and puffs that occur at or near the limb. event. This conclus

and sprays and puffs that occur at or near the limb. KEYWORDS: Solar spectroscopy, Solar physics, Solar chromosphere

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IN THE RUBY LASER					
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October 1970.	October 1970. Bedford, Massachusetts 01730				
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13. ABSTRACY	·	-			
The output of a ruby					
temperature normally co	onsists of one or	more longitud	linal ca	vity modes	
near the center of each 1 spacing is 0.38 cm ⁻¹ , b	member of the R	1 doublet. The	e nomi	nal doublet	
spacing is 0.38 cm ⁻¹ , b	ut by macking a pation of the l	oortion of the	ruby ro	na irom the	
pump radiation the separ significantly below that	value For over	ar components	1/4 ~f	reduced the length	
of a 5.08×0.64-cm ruby					
ponent separation of cnl	$y 0.20 \text{ cm}^{-1}$. Th	is paper pres	ents tv	pical laser	
spectra for masked rubi	es and also pres	ents and discu	sses ti	me-resolved	
laser spectra and fluore	scence spectra o	bserved under	• the sa	me masking	
conditions. The latter p	provide insight in	to the mechan	isms r	esponsible	
for the observed anomalies, and a theoretical model is developed to explain					
the principal features of	the principal features of the observations.				
KEYWORDS: Lasers, Inhomogeneous optical pumping, Ruby laser					
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WIND SPEEDS AS MEASURED BY CUP	AND SONIC AN	VI:MON	IETERS AND		
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December 1970.					
Bedford, Massachusetts 01730			setts 01730		
13. ABSTRACT					
Wind tunnel and field experiments have shown that the fast-response three- component sonic anemometer is a highly accurate wind speed sensor. When sonic anemometers were used as reference sensors for wind speed, slower response cup anemometers were found to consistently overestimate the wind speed. Despite measures taken during a field program in Kansas to minimize tower influence on wind measurements, the errors due to the tower effect on the windward side are inferred to be about $\pm 5\%$ of the observed wind speed ratios of cup to sonic anemometers. When the observed speed ratios are compared with the errors due to tower influence, the overspeeding of the cup anemometer is estimated to be about 10% of the reference wind speed.					
KEYWORDS: Cup anemometers, Sonic anemometers					
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THE DISCOVERY OF A 2H-3C SOLID STATE TRANSFORMATION IN SILICON CARBIDE SINGLE CRYSTALS					
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Reprinted from Journal of Crystal Growth, Vol. 8, pp. 129-131, 1971. 1971.			ge Research S) d		
^{13.} ABSTRACT Needle-shaped single crystals of 2H (wurtzite type) SiC, grown by a vapour- liquid-solid mechanism, are transformed to the 3C (sphalerite type) structure on annealing in argon at temperatures above 1400°C. The temperature at which the structural transformation is induced varies from one crystal to another ranging from 1400°C to 1800°C. The structure of the crystals before and after the heat-treatment was identified by X-ray diffraction photographs. The dis- covery of this transformation explains the absence of the ABAB packing in the structure of SiC polytypes formed at high temperatures above 2000°C and suggests that cubic SiC is the stable modification, at least over a temperature-range from 1400°C to about 1800°C.					
Annealing	rbide, Polytype,	Crystallograp	hy, Tra	ansformation,	
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Lloyd M. Logan					
Graham R. Hunt					
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Research, Vol.75, No. 32, pp.6539 6548, November 10, 1970. L.G. Hanscom Field					
	L'euloru, Ma	edford, Massachusetts 01730			
13. ABSTRACT					
Infrared spectra have been accuired	under cimulat	ad luna	n condition o that		
demonstrate that, contrary to popular be	lief features	ed luna	r conditions that		
are available for small-particle-size sa	mples The sp	ectral	information occurs		
in the form of emission maxima that are	associated wit	h the n	rincipal Christianser		
frequencies, and these maxima are diag	nostic of gross	compo	sition. The features		
represent a 5 to 30% effect, depending on) particle size a	and cor	nposition. The		
effect is explained in terms of the sharp	thermal gradie	nts pro	duced close to the		
surface under lunar conditions.	2	•			
KEYWORD3: Emission spectra, Silicates, Lunar					
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O. Oldenberg			
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Physics, Vol. 39/1, pp. 41-43,	Air Force Cambridge Research Laboratories		
January 1971.	L.G. Hanscom Field		
	Bedford, Massachusetts 01730		
^{13.} ABSTRACT These recollections were written at History of Recent Physics of the Americ was "head assistant" to James Franck fr Franck's methods of thought centers are (impacts of the second kind) and the Fra	can Institute of Physics. The author rom 1922 to 1930. Discussion of ound Klein-Rosseland processes		
KEYWORDS: History of physical science molecular theory, Franck-Condon princ processes in molecules, James Franck Göttingen	iple, Ionization and dissociation		

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John F. Paulson				
Fred Dale				
Stanley A. Studniarz				
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Mass Spectrometry and 1	lon Physics,	Laboratori		
Vol5. pp.113-126, 1970.		L.G. Hanscom Field Bedford, Massachusetts 01730		
		Beuloru, Ma	ssachus	
13. ABSTRACT				
The times-of-flight				
neutral reactions are me	asured using a l	ongitudinal do	uble ma	ass spectrometer
system. This system con				
selector, a collision cha				
filter, together with a m	ulticnannel scale	er, operated a	tdwell	times of 50 nanosec
per channel, that serves				
a pulsed beam by applyir The time-of-flight of the				
the delay between the pul				
close to the collision cha	amber used to st	on the reactan	tion he	am Times-of-flight
of the reactant and produ	ict ions through	the collision c	hamber	grid system, and
mass filter are then obta	ained by differen	ce. The appar	atus ha	s been used to study
ion-neutral reactions in	the range of read	ctant ion energ	gies fro	m 0.3 to 250 eV and
of product ion energies f	rom thermal to	about 150 eV.	Conside	eration of the source
of error indicates that th	ie system is mos	st useful for th	e range	e of ion energies
from thermal to a few te	ns of eV. Result	s obtained in t	the stud	y of three ion-
neutral reactions are pr + CO_2^+ , and CO^+ + CO_2^-	$co_{co_{co_{co_{co_{co}}}}$	re Ar + Ar-	+Ar+Ar	$, co_2 + co_2 + co_2$
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J.N. Plendl				
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13. ABSTRACT				
single-crystal and thin- variety of solids. The nor cold neutron scatteri values. A method of ca directly from elastic co render further support for The importance of these solid state physics. KEYWORDS: Lattice sp spectra, Binding forces	experimental infr a. These charac gy absorption spe- licient (k) vs freq solids in the reg- sed method, clea ey also exhibit the ises the combined film specimens. most recent data ng techniques, is loulating the vari- nstants, is also a for the developed espectra is discu- meetra, Infrared a	pared data with teristic lattice octra of solids. quency curve, gion of anomal rly resolve the e characterist d reflection an Its validity has obtained from in complete a dous modes of advanced. It is characteristic assed with rega	out hav absorp As op which i ous disp transvise transvise d trans emissi greeme yibratic c energ ard to s	ring to resort to option spectra oposed to the tra- s regarded as the persion, the spectra verse and longitudina anharmonicity and mission data on verified on a wide ion, laser-Raman, ent with the derived on of solids, caneously used to y absorption spectra iome problems in
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pp.87-97, January 1971.	,	Laboratories (LQD)		
		L.G. Hanscom Field		
		Bedford, Massachusetts 01730		
13. ABSTRACT				
The damping of latti theory analogous to dam atoms, taking into consis- structure, the cross sec (atomic size factor), as the anharmonicity of latti without need for constan- ing is shown valid for m- some ternary compounds or metallic binding. The through four. In addition thermal expansion as a fi temperature dependence the coefficient of therma energy absorption vs ten valid for the entire temp ing point, for a variety of	ping in gases. It deration the atom tion of collision, well as an anhar ice vibrations. A ts fitted to exper- ore than eighty so and elements. The v cover ten differ unction of temper is empirically end l expansion. This momentures. The erature range of	is based on the bic coordination the radius rat monic factor w semiempirica imental data. To olids, mostly to They may have rent structures nship is shown ratures. Based xpressed by an s function agre complete damp solids, from a	e colliss n due to io of th hich is l form Uhis for binary of either s and va betwee l on thi expone es with bing for bosolute	ion frequency of the crystalline e component atoms an expression for ulation is derived rmulation of damp- compounds, also ionic or covalent alencies from one en damping and s relationship, the ential function of the variation of ir rmulation is shown e zero to the melt-
KEYWORDS: Lattice spe spectra, Binding forces		bectra, Raman	spectr	a, Cold neutron

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13. ABSTRACT					
An exact longitudinal collisionless one-fluid m be anharmonic (non-sinu parameter. By means of oscillations is defined an can grow is determined. computed and the cohere 10^{-9} erg/cm^3 .	agneto plasma h soidal) in form a a pseudopotenti d the maximum Intensity of the	as been obtaine and its amplitud al well, the dom amplitude up to equatorial spon	ed. Th de invo main o o which radic-1	e wave is found to olves an arbitrary f nonlinear n a nonlinear wave E irregularities is	
KEYWORDS: Nonlinear p	lasma waves, Io	onospheric irre	gulari	ty	

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13, ABSTRACT	.L		
A theory of hydromagnetic propagati isotropic and guided modes are coupled. cluding ioncyclotron terms, is derived a of the MHD wedge. The low frequency, to weak coupling is considered in detail. involves the formation of a period-depen a direct result of the toroidal resonance, regions within the magnetized plasma. T particularly tractable model are applied anticipated spectra and the associated la bounded and open systems.	The hydroma nd is applied to axisymmetric A steady stat dent, reflectin , confines the The numerical by analogy to	gnetic v to the c case, f e soluti ng barri wave e results the plat	wave equation, in- ylindrical geometry which corresponds ion is obtained which ier. This barrier, nergy to definite obtained for this smasphere. The
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The ionospheric	spectrum of the cr	itical frequency	of the	F_2 region, f_0F_2 ,
is studied in detail a	t 35 locations durin	g solar maximu	m and a	at 21 stations
durirg solar minimu: background continua.	m. The spectra co	ntain prominent	lines s	superposed on
24, 12, and 8 hours.	Lines at half a lun	ar day (period o	f 12.48	solar periods of
at two lunisolar peri	ods have also been	detected in all th	ie spec	tra investigated.
The lunisolar lines h	ave statistically sig	gnificant amplitu	ides on	ly at the low-
latitude stations. Out	r analysis indicates	the influence in	the F	region of plasma
transport processes	such as EXB drift,	ambipolar diffu	sion, a	and iondrag effects
of the neutral air wir	id generated by the	thermospheric of	liurnal	density variations.
An assessment of the the results obtained the second secon	roues of some of t	nese processes	is attei	mpted in terms of
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pp.954-955, December	1970.			
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13. ABSTRACT				
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	Bedford, Mas	ssachus	etts 01730
13. ABSTRACT			
The temperature and frequency d acoustic surface waves on LiNbO ₃ has vacuum a frequency-squared depender a value at 1 GHz of 0.9 dB/µ sec. Ter a novel three-transducer technique sh 1 GHz) mechanism to be the interactic Propagation in air results in an addit: with a value of 0.2 dB/µ sec at 1 GHz. tion losses are also investigated both misalignment of transducers with res misalignment of the propagation-plan- delay line insertion loss. This beam LiNbO ₃ is considerably higher than of orientation. The loss mechanisms me pletely account for the insertion loss KEYWORDS: Three transducer meth-	s been measured. nce of the total at nperature-depend now the dominant on with thermally ional loss linearly The effects of the theoretically and pect to pure mode e perpendicular c steering loss on n the 41,5° rotate easured in this pa of surface-wave of	For pr tenuation lence m loss (0. excited y propo beam st experi e propa an add Y-cut 2 ed-cut X per are delay li	ropagation in on is obtained with easurements using 7 dB/ μ sec at i elastic waves. rtional to frequency eering and diffrac- mentally. Both gation axes and significantly to 2-propagating -propagating sufficient to com- nes.
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13. ABSTRACT				
Measurements of the 7 the Sagamore Hill radio ob 8800 MHz, 4995 MHz, 269 The brightness temperatur that the residual temperatu index of -1.5, which indica with the 12 November 1966 spectrum occurs with dail The flux spectrum of t is illustrated and shows a wavelength. Brightness, to optical development are de	servatory on t 5 MHz, 1415 M re spectral indures at maxim ted a flatter to eclipse where y total sun val the radio source peaking of 10.5 comperatures of	he frequencies MHz, 606 MHz ex, γ , derived um obscuratio emperature sp $e \gamma = -1.9$. A so ues during per ce associated of flux units to	s of 35 , 245 M from n (m = 0 ectrum imilar riods of with M occur 1	GHz, 15 GHz, MHz and 114 MHz. T_b = afy showed 0.96) had an than was associated flattening of f high solar activity. cMath plage 10607 mear 6.0 CM
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13. ABSTRACT .						
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A significant g	ain in signal-to-noise lized by bootstrapping	the domina on	logiooe	s and avalanche		
example is detailed	d for the detection of	6328 Å light n	ndulat	ed at 30 MHertz		
The signal-to-nois	e ratio gain in this ex	ample is 9 db	and 3 d	b for the photodiod ϵ		
	odiode respectively,					
the photodiodes are	e superior to that of a	photomultiplie	er whei	n the light intensity		
is greater than .05	microwatts for the a	valanche photo	diode a	and 1 microwatt		
for the photodiode.						
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KEYWORDS: Photomultipliers, Photodiodes, High speed light detection

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Journal, Vol. 162, pp. 1037-1047,	Laborator				
December 1970. KEYWORDS: Shock	L.G. Hansco				
tube, Oscillator strengths, Spectra,	Bedford, Ma	ssachus	etts 01730		
13. ABSTRACT					
Absolute gf-values for 118 Fe I line have been measured by shock-tube emis	s in the visible	e region	of the spectrum		
given to choosing relatively faint lines in					
photospheric continuum and to eliminatir					
purpose, the gas kinetic temperature wa					
technique for every shock, and a special					
experimental parameters were varied ov					
validity of the assumptions of local there					
optical thinness were verified. Our resu Corliss and Tech's free-burning-arc me	uis are in iair.	iy good	agreement with		
show large disagreements for lines havi					
nitude of the discrepancies is largely de	pendent upon u	pper ex	citation potential		
and to a lesser extent upon wavelength.					
and high-excitation lines agree to within					
by other independent investigations, which include shock-tube, wall-stabilized-					
arc, atomic-beam, and beam-foil measu					
solar photospheric abundance of iron ma of the various recent measurements of g	iy need to be re if-values for h	igh-eye	itation lines which		
are consistently smaller than reported f	ree-burning-a	rc value	s by nearly 1 order		
of magnitude. These free-burning-arc f-	-values and the	e furnac	e-absorption		
f-values upon which they are based have	repeatedly led	to the	paradox of solar		
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rocket flights have been examined previously developed under contra 69-0222. Two of these flights ex burnout and for several seconds a increase in coning angle followed more gradual divergence consisten body kinetic energy histories sho implies that energy is temporaril structural deformation. The magn motion is small enough so that de penalty is feasible. The previous study indicated stabilized sounding rocket could de-spun rotor stabilization syste economically verify the performan an electromechanical simulator wa rotor stabilizer, included in the results. Performance of this syst results. A logical next step in this and flight testing of several rot KEY WORDS: Sounding rocket, Stability,	using rig ct F19628- hibited ro fter. All by an act t with ind w a double y stored i itude of t -spun damp that coni be elimina m. In an ice of this s designed system, w em checked program is or stabili	id body 69-C-002 bil-pitch exhibit cual decr reased a peaked internall che energ bing of r ing diver ited by t effort t system and fab vas teste closely s the des	energy techniques 9, Report AFCRL- 1 lock-in through ed a rapid initial rease and a later 1 titude. The rigid character which y such as in y in transverse reasonable weight gence of a spin- the use of a passive to effectively and in hardware form pricated. A passive d with positive with predicted lign, fabrication lems.	
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ated. Ternary phase relationships for the per	rylene-iodine	e carbon d	isulfide system have	
been obtained at $25^{\circ}C$ and $35^{\circ}C$. Smoothed so $(I_2)_2$ species are presented for both $25^{\circ}C$ and	olubility curv	ves for the	$P_{7}(I_{2})_{10}, P_{2}(I_{2})_{3}, and$	
$P(I_2)_2$ species are presented for both 25°C and	135°C. The	solubility	/ cúrves for -9 - dicyan	
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rile have been determined and the conditions	for crystal g	rowth of the	hese materials are pre-	
sented.		-		
The free energies of formation, hea			-	
been deduced for the $P_7(I_2)_{10}$, $P_2(I_2)_3$ and $P(I_2)_3$	3 species f	rom the so	olubility data and pre-	
rious gas-solid reaction štúdies.				
The factors which hinder the crystal				
nave been identified as extremely small solub				
oility with temperature. The requirements for				
ques for growing single crystals of these materials are stated. These include specifica-				
ions on the allowed temperature gradients and			s which will prohibit	
he onset of dendritic growth through constitut			A A A A	
Results from the program indicate th				
of both the perylene-iodine compounds and the				
onitrile will require extremely close control of solution temperatures and temperature				
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In an effort to circumvent the diffic and processing the telemetry data from a bu- and Analysis and Simulation Branch (SUYA) of Jaboratories (AFCRL) at L. G. Hanscom Field engaged in the development of a Satellite I (as described in AFCRL-67-0561) to provide gramming system capable of handling the raw	of the Air Force Cambridge Research L, Bedford, Massachusetts, has been Data Reduction Processor System (SADAR) a general and flexible computer pro-					
This report describes a system to process raw telemetry data from the $0V_3-6$ Satellite and the display of the various experimental results.						
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charged particle studies of the aeros	space environment have	included	the development
of (1) spark-discharge modules that	are sealed against the	snace env	ironment (2) a
high-voltage generator with a long li	fetime for use with spa	rk chamb	ers in space, (3)
a passive readout technique for spar	k-discharge counters.	and (4) a	method of apply-
ing a clearing field that consumes no		-	
derived for the flux of protons within	n cylindrical shell and a	slab disk	shields exposed
to protons in space. Reported also :	are studies in space rad	diation do	simetry.
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wide variety of crystalline igneous rocks, a reasonably unique relationship should				
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exist between resistivity and strength. Three airborne electromagnetic surveying	,			• • • •
techniques hold promise for measuring ground conductivity in the desired range.			•	-
These are, in order of the ease with which surveys might be made with existing or modified systems, the wave-tilt method, the long-grounded-wire method and the		•	-	-

modified systems, the wave-tilt method, the long-grounded-wire method and the INPUT method. The wave-tilt method makes use of waves radiated by VLF broadcast stations in the frequency range from 15 to 30 KHz, and is useful with no modification of commercially available equipment, as field tests described in this report indicate. The long-grounded-wire method makes use of fields from a currentcarrying cable installed specifically for a survey. The INPUT method makes use of a transmitter carried on the aircraft with the receiver. However, in order to measure conductivities in the range of interest with the existing commercial INPUT system, major modifications would be required.

KEYWORDS: Rock strength, Strength variations, Wave tilt

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During entry into the vehicle, a plasma sheath ambient gases and ablatic causes the interruption of ground based stations com- blackout. To solve the b- sheath properties (electr temperature and plasma st causes and effects of the together with a discussion review of the flight expe- the reentry plasma.	envelops the veh on of the heat sh of radio communic amonly referred to blackout problem, con density, elect cand-off distance reentry plasma on of reentry plas	hicle because hield materia cations betwee to as the ree , a knowledge ttron collisi e) is require sheath is pr asma diagnost	e of shock il. This p een the spa- entry commu- e of the re- con frequented. A summa resented in fic technic	heating of the plasma sheath ace vehicle and unications eentry plasma ncy, electron mary of the n this report ques and
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performance, of using a "warm" or "compre	ionosphere and during the atmospheric inderstanding of the performance of purposes as well as for determining ons blackout problem. The results of the cated the necessity, when analyzing antenna
of the hydrodynamic, compressible plasma report together with a discussion of appr review of the antenna analyses which have plasma theory is presented to illustrate antenna-plasma analysis.	particles. The classical derivation theory equations is included in this copriate boundary conditions. A to been performed using this compressible

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An analysis of surface-mounted aper performed in this study to determine the measurements can be used for reentry pla contribution of the present work is the of a thin, microwave aperture antenna, if vehicle, can be used to obtain the value collision frequency, ion sheath thickness reentry plasma. It is further demonstra- made during a reentry test flight as rep Trans. Antennas and Propagation, <u>AP-17</u> , antenna admittances can be used to deter electron collision frequency and plasma plasma is separated, due to aerodynamic surface of the reentry vehicle.	conditions u sma diagnosti determination ocated on the s of the elec s and electro ted, by using orted by Mayh 573), * op mine the plas stand-off dis	nder which cs. The p that the surface of tron dens. n temperal admittan an et al. en-ended-v ma electron tance when	h admittance primary admittance of a reentry ity, electron ture of the ce measurements (1968 IEEE waveguide on density, n the reentry
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13. ABSTRACT the Advanced Research Projects	Bedford, Massad	chusett	s 01730
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Coast and Geodetic Survey, for the inte	erval January 1.	1961 t	hrough
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The main feature is the continuation of	the Mid-Atlant:	lc seis:	mic belt
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Scientific Final (1 June 1968 - 1 Febr	ruary 1971 ; Approved 14 January 1971
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borne dual-photometer system for inv distribution in a noctilucent cloud mounted with the axis of the field of the rocket. This photometer is equi degree of polarization of the cloud at a specified wavelength (3750Å). 60 degrees to the spin axis. The in	is described. One photometer is of view parallel to the spin axis of ipped with a polarizer and observes the at a particular scattering angle and The second photometer is oriented at
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An experimental inve	stigation of a	pair of coup	led linear	antennas in an in-
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0.50, 0.75, and 1.0) with t antenna axes.	ne medium inh	nomogeneity	airection	perpendicular to the
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	Bedford, Mass	achusetts 01730
13. ABSTRACT		
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This research was supported, in part, by the Air Force In-House Laboratory Independent Research Fund.	Laborato	ries (LKI)	e Research L.G. Hanscom Field etts 01730
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theory. The results of gravity wave theory are be compatible with the theory although a co not feasible.	discussed an omplete iden	d the meas tification	urements are shown to of the motions is
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13. ABSTRACT	L. G. Hanse	on Fiel	d. Bedford, Mass. 01730
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Clive H. Perry			
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The influence of phase angle, compact	ness of mate	rial and p	article size on the
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materials is presented.			
The determination of the $k \approx 0$ longit			
the dielectric and inverse dielectric resp			
discussed. The results of the temperature	dependence	over the r	ange 5-400°K of the
$k \approx 0$ LO frequencies and lifetimes of 18 a.	lkali and th	allium hal	ides are given as
determined from Kramers-Krorig analyses of reflectance data and from small grazing an	near normal	incidence	single-crystal
conducting substrates. In addition, the p	ressure depe	ndence up	to 5 kilobars at
290°K of the LO frequencies of RbI, CsBr and	nd CsT is re	ported.	
Far infrared transmittance and reflect			surements at near
normal incidence and Raman spectroscopic me	easurements	are report	ed for poly-
crystalline thallous iodide in the tempera			,
The results of reflectivity measurement	nts as a fun	ction of p	hase angle for fused
quartz and calcite single crystals are pre-	sented toget	ner with t	he reflectivities as
a function of particle size, packing fract	ion and phas	e angle fo	r powdered samples
of quartz and calcite.			
Infrared and Raman measurements of a particular characteristic lattice and Christian	number of mi	nerals are	used to determine
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KEYWORDS: Crystal growth, Gels; gelling	process; Nucleation, Diffusion
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11. SUPPLEMENTARY NOTES Reprinted from IEEE Journal of Quantum Electronics, Vol. QE-6, No. 10, October 1970, pp 616-621	Air Force Can Laboratorie L.G. Hanscon Bedford, Mas	nbridge s (OP) n Field	Research
13. ABSTRACT	· · · · · · · · · · · · · · · · · · ·		
Electrostriction is a cause of laser beam s glass. It predominates over other self-foc or thermal self-focusing, under certain co self-focusing can occur even if the laser pu is achieved, provided the pulse power is la threshold power for self-focusing is indepe region, the threshold power increases and initial beam radius, in the limit of large ra theoretical trapping threshold derived here thresholds for track formation in glass.	using mechanis nditions. This ilse is so short rge enough. In ndent of beam s becomes propor adius beams or	ms, su paper s that no the ste ize. In tional short p	ch as Kerr effect hows that steady state ady state, the h the transient to the square of the ulses. The
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13. ABSTRACT The consecutive ion-molecule reaction	s in ace ylene v	vithin tl	he pressure limits
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Various basic decisions are made with rega	rd to field	size, Boole	an encoding of field
elements and primitives for the context of	design: act	ual logic d	lesign is then carried
out in the familiar language of polynomial	a. Reasonin	g mrocesses	are identical to
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report attempts to give an introduction to			
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Galois functions and its categorical impli	cations. Th	ere 15 8 00	
Boolean encoding procedures which lead to	nighty erric	lent Galois	multiplication gates
and optimal Galois addition gates. Variou	as single-pri	citive syst	ems are considered,
capable of utilizing a single LSI chip-typ	e throughout	any networ	k to be designed.
One especially natural primitive offers th	ne additional	potential	of maximizing
effective LSI-yield. Methods are suggeste			
Galois functions in two-primitive and one-	primitive sy	stems. In	conclusion, a variety
KEYWORDS: MSI/LSI, Logic Design, Cell	lular arrays	, Finite fi	elds
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This research was supported by the Feder Aviation Agency, Washington, D.C. 20590 * ABSTRACT An experimental pulsed neodymlum lidar system was modify properties in fog and low cloud conditions. The objective was ing slant visibility conditions for aircraft landing operations. To range was extended to 50 dB by using a two-stage receiver syst to make close-range observations. Field trials were carried out at a temporary site at Half Moo Arcata, California, in May/June and August 1970, respectively, array of up to five AN/GMQ-10 transmissometers. Observation using arrays of passive targets to provide information on atmosp derived from lidar/target data and from AN/GMQ-10 transmission someters. Thus, a lidar with the support of passive targets coult termining atmospheric transmittances were computed from the value and between the lidar data and the transmissometer data ditions. The concept of remotely deriving extinction coefficients alo tanding problem. Using values of extinction coefficients from at consideration to start different angles of elevation, examples are given of the plot would look (at a cockpit cut-off angle) from the critical 1 these evaluations of slant path transmittance was available. Po are outlined, and the potential use of lidar for evaluing the gen	ral Air Force Cambridge Research Laboratories L. G. Hanscom Field (LC)
This research was supported by the Feder Aviation Agency, Washington, D.C. 20590 Control State An experimental pulsed neodymlum lidar system was modify properties in fog and low cloud conditions. The objective was ing slant visibility conditions for aircraft Landing operations. To range was extended to 50 dB by using a two-stage receiver syst to make clow-range observations. Field trials were carried out at a temporary site at Half Mod Arcata, California, in May/June and August 1970, respectively, array of up to five AN/GMQ-10 transmissometers. Observation using arrays of passive targets to provide information on atmosp derived from lidar/target data and from AN/GMQ-10 transmiss someters. Thus, a lidar with the support of passive targets coult termining atmospheric transmittance. Single-ended lidar data were obtained along horizontal path was found between the lidar data and the transmissometer data dittons. The concept of remotely detiving extinction coefficients alo tanding problem. Using values of extinction coefficients for a tra- tions at different angles of elevation, examples are given of the pilot would look (at a cockpit cut-off angle) from the critical i these evaluations of slant path transmittance was available. Pon are described.	Air Force Cambridge Research Laboratories L. G. Hanscom Field (LC) Bedford, Massachusetts 01730 ied and calibrated to obtain accurate data on atmospheric extinction to establish the theoretical and practical basis of a system for measur- operate in conditions of fog and low cloud the lidar system's dynamic em. In addition, the transmitter and receiver beams were made coaxial m Bay, California, and at the National Bureau of Standards site at At Arcata, data were collected in conjunction with measurements by an is were made in clear weather and in conditions of fog and low cloud bergie extinction. The correlation between atmospheric transmittance serie made in clear weather and in conditions of fog and low cloud bergie extinction. The correlation between the data from individual transmis- bergie equaled that found between the data from individual transmis- be lidar data using analytical methods (which are discussed in detail) of ion of the "slope" of the lidar trace. A correlation coefficient of 0.97 for comparable path transmittances in a variety of low-visibility con- ft from observations by a ground-based lidar was applied to the aircraft opheric layers above the surface derived from series of lidar observa- caluation of transmittance over the line-of-sight path from which a sight to the surface to acquite visual reference. No corroboration of wh
This research was supported by the Feder Aviation Agency, Washington, D.C. 20590 Asstact As experimental pulsed neodymlum lidar system was modify properties in fog and low cloud conditions. The objective was ing slant visibility conditions for aircraft landing operations. To range was extended to 50 dB by using a two-stage receiver syst to make close-range observations. Field trials were carried out at a temporary site at Half Mod Arcata, California, in May/June and August 1970, respectively, array of up to five AN/GMQ-10 transmissometers. Observation using arrays of passive targets to provide information on atmosp derived from lidar/target data and from AN/GMQ-10 transmiss someters. Thus, a lidar with the support of passive targets coult termining atmospheric transmittances. Single-ended lidar data were obtained along horizontal path was found between the lidar data and the transmissometer data dituons. The concept of remotely deriving extinction coefficients alo landing problem. Using values of extinction coefficients alo landing problem. Using values of extinction coefficients alo landing problem. Using values of extinction coefficients alo landing problem. Using values of extinction coefficients alo landing problem. Using values of extinction coefficients alo landing problem. Using values of extinction coefficients alo landing problem. Using values of extinction coefficients alo landing problem. Using values of extinction coefficients alo landing problem. Using values of extinction coefficients alo landing problem. Using values of extinction coefficient for at who would look (at a cockpit cut-off angle) from the critical is these evaluations of slant path transmittance was available. Por are outlined, and the potential use of Idar for revealing the gen- are described. The problem of realizing an operational system in an ultimation KEY WORDS: Lidar measurements of via	Air Force Cambridge Research Laboratories L. G. Hanscom Field (LC) Bedford, Massachusetts 01730 ied and calibrated to obtain accurate data on atmospheric extinction to establish the theoretical and practical basis of a system for measur- o operate in conditions of fog and low cloud the lidar system's dynamic em. In addition, the transmitter and receiver beams were made coasial m Bay, California, and at the National Bureau of Standards site at At Arcata, data were collected in conjunction with measurements by an is were made in clear weather and in conditions of fog and low cloud oheric extinction. The correlation between atmospheric transmittance smeters equalled that found between the data from individual transmis- d replace a transmissometer system with comparable accuracy in de- stadjacent to the passive targets and to a 500-ft base line transmis- e lidar data using analytical methods (which are discussed in detail) of ison of the "slope" of the lidar trace. A correlation coefficient of 0.97 for comparable path transmittances in a variety of low-visibility con- ft from observations by a ground-based lidar was applied to the arcraft isopheric layers above the surface derived from series of lidar observa- calculation of transmittance over the line-of-sight path from which a neight to the surface to acquire visual reference. No corroboration of suble means of deriving and presenting such data for operational purposes ieral conditions of cloud and fog conditions in the artifield approach
This research was supported by the Foder Aviation Agency, Washington, D.C. 20590 Asstance astance asstance asstance astance asstance asstance asstance assta	Air Force Cambridge Research Laboratories L. G. Hanscom Field (LC) Bedford, Massachusetts 01730 ied and calibrated to obtain accurate data on atmospheric extinction to establish the theoretical and practical basis of a system for measur- o operate in conditions of fog and low cloud the lidar system's dynamic em. In addition, the transmitter and receiver beams were made coastal in Bay, California, and at the National Bureau of Standards site at At Arcata, data were collected in conjunction with measurements by an is were made in clear weather and in conditions of fog and low cloud observe extinction. The correlation between atmospheric transmittance ometers equalled that found between the data from individual transmis- d replace a transmissometer system with comparable accuracy in de- s adjacent to the passive targets and to a 500-ft base line transmis- ce lidar data using analytical methods (which are discussed in detail) of ion of the "slope" of the tidar trace. A correlation coefficient of 0.97 for comparable path transmittances in a variety of low-visibility con- ft from observations by a ground-based lidar was applied to the ancraft toopheric layers above the surface derived from series of lidar observa- calculation of transmittance over the line-of-sight path from which a sengit to the surface to acquire visual reference. No corroboration of suble means of deriving and presenting such data for operational purposes teral conditions of cloud and fog conditions in the artifield approach te form is considered and some potential approaches to this end are noted.

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Jeffrey C. Harp			
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Variance and power spectru	m of intensity	fluctuati	ions of a single
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copper-doped Germaniun detector a	and analog inst	rumenta	tion. RMS
intensity fluctuations above the osci	illation thresh	old was s	smaller than
0.3% of the average intensity. The	measurement	s near tl	ne oscillation
threshold, however, were not accur	rate, because	the acou	stic disturbance
due to acoustical noise, bubbles in	the cooling wa	ter and t	temperature
fluctuations in the plasma tube were	e predominant	over the	fluctua tions
due to spontaneous emission. The	power spectru	m obser	ved at frequencies
above 10KHz showed features char	acteristic to t	he laser	model o'Van
der Pol oscillator driven by the ran	dom noise. I	nprovem	ients of CO ₂
gas laser desirable for further inve	-		
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13. ABSTRACT This report is divided into three	parts				
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(2) The disturbance of the ionosphere by a long period travelling wave originating in the northern hemisphere has been detected in the southern hemisphere with the accompanying expected phase change as the wave crosses the magnetic equation.					
(3) A comprehensive survey has been anomalous sounds from auroras. Puthat the theory of brush discharge served phenomena without inconsist	reliminary res e can properly	sults	seem to show	ob-	
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13. ABSTRACT I. Several methods for the analysis of the from hydrocarbon pyrolysis are examined. The method analysis of the hydrogen content by mass spectrometr series of replicate runs with a standard deviation 3.5% II. The pyrolysis of naphthalene has been studied by t products show that there is no splitting of the C-C bo the products of the reaction. The naphthalene polyme chromatographic methods.	od of sample combust y and carbon dioxide on samples in the 1.5 he flow system and st ond and that hydrogen ers are characterized 1	tion is an o by mano: 5-8 mgm r tatic meth n and poly by mass sp	oxygen atmosphere and metry gives results on a ange. hods. Analysis of the ymers of naphthalene are pectrometer and gas	
The rate constant for hydrogen formation in the initial stages of the pyrolysis can be expressed by $k_{H_2} \approx 2.3 \times 10^{-1.5} \exp_{e} - \frac{71800}{RT}$ <u>litre - mole</u> in the range temperature 650-700°C. The kinetics data and reaction products can be explained by either a bimolecular or free-radical predominantly homegeneous reaction mechanism.				
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13. ABSTRACT			<u></u>		
Measurements of spectral absorption a	nd photoionizati	OE Cros	sections of CO2,		
NH., 0, COS, NO, N, and vinyl chloride i A number of new Ryiberg series were found with the photoionization values.	and the converge	nce lin	nits were compared		
In the study of dispersed rluorescend given to the emissions from CO, NH ₃ , N ₂ , a 6000 Å. The experimental Franck-Condon fa good agreement with the theoretical values transition was observed at $(1245 + 10)$ Å.	nd NO in the spe actors for CO and . The threshold On the basis of	ctral 1 N ₂ wer för th ', the ob	region 1800 to re found to be in he NH $c^{\perp}\Pi \rightarrow a^{\perp}\Delta$ pserved threshold of		
the NH emission, the calculated energy separation of the $a^{\pm} \delta$ state from the ground state of NH is (2.2 ± 0.1) eV which is somewhat higher than the value previously reported. The excitation spectra of NO show many overlapping states. However, the B' \rightarrow X transitions of NO were identified, and the experimental Franck-Condon					
factors are in agreement with the calculated values. The results suggest that the γ' band contribution in NO emission is negligible. The excitation spectra of other molecules such as H ₂ , O ₂ , and SO ₂ were studied, and certain features of the emission					
spectra can be related to the spectral abs The effect of molecular collisions or Quenching of the B', D, E, and F states wi was observed.	orption. the fluorescend	e of N) was investigated.		
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13. ABSTRACT	* · · · · · · · · · · · · · · · · · · ·		
Ion drag is one of the dominant forces whic thermosphere. As a result, the neutral wi electric field. Improved agreement between experimental data has been obtained by incl purison with Thomson scatter data shows th computed meridional wind occurs at the same	nds are modifie in theoretical with uding the effect nat the reversal	d bythe nd veloo s of the of the	presence of ar cities and dynamo field. Com- theoretically
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extent and nature of chemical	changes	nroduc	ed in colid tem	F
gets by fast heavy particle in	radiatio	n Th	ed in solid lar	T
of the work involved proton ir	radiatio	n of so	olide using ene	Low
ranges from U./ to 2.5 MeV. A	lpha par	ticles	and deuterons	
vere also available and were u	used for	special	l studies. In	i
general, the results of the bo	mbardmen	ts were	e evaluated wit	ĥ
ather electron spin resonance	ESR or	differ	cential thermal	
thermal analysis [DTA] techniq	ues.			
The data provided by the ES	R analyt	ical me	ethods tends to	
substantiate the conclusion the	at proto	n bomba	ardment of dia-	
Nond results in the formation	OI CH TA	dicale	Furthermore	I .
there is no doubt that H atoms	can be	trapped	in the dia-	1
nond lattice and will remain u	ncombine	d at li	Lquid nitrogen	1
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KEYWORDS: Radiation damage, D	liamonds,	Proton	S	
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1970, Vol. 3, pp 789-796	L.G. Hanscom	• •		
	Bedford, Mass			
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13. ADSTRACT				
Townsend's primary and secondary ionizal				
0.003, 0.03, 0.3 and 3% of n-pentane, ethy	vlene and acetyle	ne mi	xed in argon for a	
total pressure in the range of 0.5 to 50.2 to For n-pentane, a concentration of 15% was				
effect is again observed and is greatest in				
enhancement of Townsend's primary ioniza				
that previously observed in the classical ra				
bons are observed to be efficient quen hing				
the less efficient. At an optimum concentr	ation of 0.03% fo	or all	the mixtures the	
sparking voltage is lowered considerably b				
being the most — and amounting to a factor acetylene mixtures.	somewhat great	er tha	in 4 — in argon-	
acerylene imaturee.				

KEYWORDS: Measurement of Townsend's primary and secondary ionization coefficients. Hydrocarbon-argon mixtui :s. Pennink effect DD FORM 1473

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ASPECT OF ELECTPIC STRENGTH OF A	MOVING GAS			
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	L.G. Hansc			
	Bedford, Massachusetts 01730			
13. ABSTRACT	·			
The influence on the prebreakdown processes and the sparking voltage of a gas moving at an angle to an electric field across a uniformly stressed gap is consid- ered quantitatively by invoking the equivalent-pressure concept. The velocity with which a moving gas displaces the charged particles taking part in the processes leading to a spark is found, and the variation of the gap strength with the gas flow is calculated. With a pure cross gas flow, no change in the electric strength is predicted, and this is in agreement with experiment where gas speeds up to 2 X 10 ³ m/s have been attained. With axial gas flow, the moving gas can either increase or decrease the gap strength depending on the direction of the gas flow relative to the field due to the direct applied voltage, and provided the gas speed is comparable in magnitude with the electron drift velocity (under a. c. conditions, a reduction in strength always occurs). A novel method for obtaining the electron drift velocity, and hence the electron-molecule-collision frequency, by the use of a moving gas is evolved. The analogy between a moving gas and an applied crossed magnetic field is pointed out. This leads to a second method is - obtaining the electron drift by the simultaneous application of a moving gas and a crossed magnetic field. Possible relevance to compressed-air-blast circuit breakers is considered.				
KEYWORDS: Theory prebreakdown, Proces	sses and sparkir	ng, Vo	ltage of a moving gas	

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4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Scientific Final. 1 October 1969 - 3	0 September 19'	70.			
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13. ABSTRACT					
The final results of a three-part experi on gaseous Townsend discharge are con influence on the prebreakdown processe moving at an angle to an electric field a sidered quantitatively by invoking the e with which a moving gas displaces the processes leading to a spark is found, with gas flow was calculated.	ntained in this r es and the sparl across a uniform quivalent press charged particle and the variatio	eport. cing vol mly stru- ure con es takin on of the	Firstly, the tage of a gas essed gap was con- cept. The velocity g part in the gap strength		
Secondly, Townsend's primary and secondary ionization coefficients have been measured in .003, .03, and 3% n-pentane, ethylene and acetylene mixed in argon for a total pressure in the range 0.5 to 500 Torr and for a uniform field gap up to 1 cm. For n-pentane, a concentration of 15% was also employed.					
Thirdly, further work on the dynamic Townsend discharge in a crossed magnetic field is presented. This work includes both experimental and theoretical results on pulsed discharge propagation and measurement of the E/P and other avalanche parameters using the balanced pulse technique.					
KEYWORDS: Townsend's primary and se. Sparking voltage, Argon-hyd	ondary ionizati Irocarbon Penni	ion coef	ficients, tures		
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<u>Coral Gables, Florida 33124</u>	
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WITH AN INTERACTING ATMOSPHERE ANI	ID OCEAN MODEL
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A simple four-level primiti	ive-equation model of a zonally-
symmetric tropical atmosphere has	is been combined with a two-layer
model of the upper tropical ocear	in in order to predict three years of
	(ITCZ) behavior under the influence
of seasonally-variable solar heat	iting of the sea. A cold equatorial
surface develops on account of ou	ceanic upwelling and vertical mix-
-	
ing; a single ITCZ establishes it	
surface temperature maximum in the	the warmer hemisphere. This conver-
gence zone mignates quickly between	veen hemispheres, with only a minor
log when the purphers of the set	oon namisphoros, with only a minor
	easons causes the hemispheric sur-
face temperature asymmetry to rev	everse every half year. Such
behavior is qualitatively in acco	ord with that of the updraft branch
of the mean tropical Hadley circu	
The lag of maximum sub-equatorial	i sea surface temperature behind
	is computed to be about nine weeks,
	10 compared to be about fille weeks,
a reasonable value.	
KEIWORDS: Numerical model, S	Seasonal variations, Tropical atmospher
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A high energy neutron detector flux, under quiet or active Sun con					
The detector consists of a plastic	scintillator (the centr	al detecto	or) with anticoinci-		
dence shield. The central detecto			. 11		
purpose is to bring to rest the rec effects and keeping the detection e	fficiency high enough	at high er	ne sen-gaung nergies. No finite		
flux has been however detected an	d an upper limit 5.5 x	(10 ⁻³ n/c	m sec has been		
established for the continuous flux					
with the supper limits obtained or upper limit of 30 n/cm ² is established					
omnidirectional intensity of atmos	pheric gamma rays, c	onverted	in the aluminium		
sheath, has been measured at ball					
0.33/cm ² sec has been found for e good agreement with those obtaine			ine results are in		
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Durham,New Hampshire 03824					
AN INTERFEROMETER SYSTEM FO THE AZIMUTH OF RADAR ECHOES					
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Scientific Int. 1. Autrophile (First mane, middle initial, last name)	erim				
Ronald R. Rudman Filson Albert D. Frost Ronald	H. Glan: R. Clar	•k			
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To improve the measurement of the azimuth direction of arrival of radar echoes at 36.8 MHz a digitally controlled phase sequence interferometer technique has been developed for incorporation into the UNH/AFCRL meteor trails radar system. Phase measurements are made with respect to a common calibration pulse inserted between successive echoes. Freliminary tests indicate an azimuth measurement capability of better than <u>+</u> 2° when used in conjunction with an elevation measurement system of comparable accuracy.					
KEYWORDS: Meteor trails, Interferometer, Meteor radar, Digital switching, Direction finding					
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KEYWORDS: Remote sensors, Water, Vegetation, Soil, Rock, Topography Bedford, Massachusetts 01730	Vegetation, Soil, Rock, Topography					
¹³ . ABSTRACTISopleth mapping, computation of Pierson's Correlation Coefficient, and multiple linear regression analysis have been employed to analyze the system: water- vegetation-soil-rock-topography in a 50 mile long, 12 mile wide area centered on Ashe ville, North Carolina. Comparison of data suggests that analysis of the 100 random						
samples give results which are comparible to isopleth mapping of 196 sample site: for variables which have relative abundance and which have relatively contrasting proper- ties of weathering, erodability and water retention. These variables are clay and silt						
in soils, quarts in soils, potassium feldspar in soils and bedrock, garnet in soils,						
biotite in both soils and bedrock, and muscovite in bedrock, and they appear to be dependent on a unique combination of independent variables. Accordingly it appears						
that lowlands (Case A) will be more likely to have clay rich soils, with relatively						
longer channel lengths per square mile, and to have soils which have low color values						
and relatively more soil moisture. The subsurface is likely to have abundant muscovit or biotite in both soils and bedrock, and garnet will be associated. Quartz will pro-						
bably be essentially absent in the shallow subsurface. Conversely uplands (Case B)						
will probably have abundant silt and sand in soils, have shorter channel lengths per						
square mile, and have soils which have high color values and lov soil moisture con-						
tents. The subsurface will probably have moderate to abundant quartz, and relatively great proportions of potassium feldspar. It appears that different steady states exist						
for these two different bedrock conditions. The flow of matter and energy in the syste	nd energy in the system					
implies that surface phenomena will evolve in response to each condition of bedrock						
so as to develop a unique combination of topography, water and vegetation conditions. If enough measurements are made under enough varying climcatic geologic, and topo-						
graphic conditions, then a catalog could be developed which would allow useful integers. ences to be made from measurements of surface phenomena on remote sensor images.						
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parameters, were launched from the Canada in late March 1969. Ejecte utilized to obtain simultaneous me the aurora. The instrumentation i	nted with payloads for measuring auroral c Churchill Research Range, Manitoba, d nosetip payloads and main payloads were assurements at separate locations within included electron and proton counters, probes, X-ray counters and auroral light station are presented.		
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18. ABBTRACT					
General formulations for temporal fr of plane, spherical and beam waves operat weak turbulence and frozen-in assumptions are obtained for the amplitude at two fre the amplitude at one frequency and the ph examined in detail for a plane wave case. fraction κ^{-n} in the inertial subrange, th for $\omega + 0$ and $k^2 \omega^{1-n}$ for $\omega + \infty$. The phas as $k^2 \omega^{1-n}$ with different constants. Thes work of Janes, Thompson, Smith, and Kirkp plains the ratio of the spectra at two fr slope of -2.6 as $\omega + \infty$ which may be compa spectrum of $n = 11/3$. The amplitude and results agree well with the experimental the general validity of the theory for fr path length as long as 50 km. It is also velocity and the structure constant C _n ca	ing at two frequ. The cross spec- quencies, the phase at another fil- For the spectrum for ω e amplitude spec- e spectrum for ω e results agree to atrick at 9.5 GH equencies. Also red with 1 - n = phase coherence - Sata. This agree equencies as low shown that usin	encies ctra ar ase at requence um of (trum be $\rightarrow 0$ ar well wi z and : noted -2.66 are cal ement is as 10 g the 4	are given based on ad the coherence two frequencies, and ty. The results are the index of re- thaves as $k(5-n)/2$ ad for $\omega + \infty$ behaves by the experimental 34.5 GHz, and ex- is the experimental using the Kolmogorov culated and the is indicative of ~ 30 GHz and the above theory, the vin		
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The objectives of this program were to perform ex- perimental investigations directed toward the design and fabrication of new charged particle detectors. The particle detectors are to be used in satellite, rocket, and labora- tory experiments to study the magnetospheric boundary re- gions of space and must be capable of detecting particles with energies of 1 keV or less maintaining high counting efficiency. To attain these goals it was necessary to do extensive field plotting of entry dynode structures in or- der to arrive at a design configuration that would insure good collection and counting efficiencies, also it was ne- cessary to devise equipment, fixturing, and testing tech- niques for accurately determining spatially, these effi- ciencies.					
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