

Report Documentation Page

Form Approved
OMB No. 0704-0188

Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

1. REPORT DATE 10 AUG 2010	2. REPORT TYPE Final	3. DATES COVERED 09-02-2009 to 08-03-2010			
4. TITLE AND SUBTITLE Development of a Charged-Particle Accumulator Using an RF Confinement Method VI		5a. CONTRACT NUMBER FA23860914065			
		5b. GRANT NUMBER			
		5c. PROGRAM ELEMENT NUMBER			
6. AUTHOR(S) Ryugo Hayano		5d. PROJECT NUMBER			
		5e. TASK NUMBER			
		5f. WORK UNIT NUMBER			
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) University of Tokyo,7-3-1 Hongo, Bunkyo-ku,Tokyo, Japan,JP,113-0033		8. PERFORMING ORGANIZATION REPORT NUMBER N/A			
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) Asian Office of Aerospace Research & Development, (AOARD), Unit 45002, APO, AP, 96338-5002		10. SPONSOR/MONITOR'S ACRONYM(S) AOARD			
		11. SPONSOR/MONITOR'S REPORT NUMBER(S) AOARD-094065			
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT This is the final report of a project to construct a trap to accumulate a large number of positrons.					
15. SUBJECT TERMS Particle Physics, Positrons, Paul Traps					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 1	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

Final Report for AOARD Grant FA2386-09-1-4065 “**Development of a Charged-Particle Accumulator Using an RF Confinement Method VI**”

10 August 2010

Name of Principal Investigators: Ryugo Hayano

- e-mail address : hayano@phys.s.u-tokyo.ac.jp
- Institution : University of Tokyo
- Mailing Address : Department of Physics
7-3-1 Hongo, Bunkyo-ku, Tokyo 113-0033
- Phone : 03-5841-4235
- Fax : 03-4496-4043

Period of Performance: 2/9/2009 – 3/8/2010

This project was recognized at CERN as one of the important R&D projects, in which traps were to be constructed for storing large quantities of positrons.

We completed the final design of the Paul-trap electrodes, and based on the test-cavity results, we produced of the final version of the electrodes. Raw materials were obtained, and machining was done at CERN.

We also completed the cool-down test of the cryostat. This was a time consuming process, because every time a vacuum leak was found, the faulty part had to be sent back to the central workshop for repair. Due to the mechanical and cryogenic complexity of the device, several iterations of the cool-down test were necessary.

Once the cool-down test was completed, we installed the Paul-trap cavity in the cryostat, and connected it to an RF source. We first measured the quality factor (Q) under low-power conditions, and then we tested the voltage-standing capability of the cavity under full power.

Upon completion of the cryostat test and the cavity test, we then used an electron gun to ionize hydrogen (residual gas in the trap was sufficient), trapped the liberated protons, “opened” the trap (by lowering the voltage applied to the end cap electrode of the trap), and counted the number of trapped protons using a Faraday cup.

All these tests were successful. Our next step will be to attempt to trap positrons.