

FY2013

JSPS Core-to-Core Program
-Strategic Research Networks-
Research Report

Project No.	21002
Research Theme	Establishing an International Collaboration Platform for Strangeness Nuclear Physics by Electron Beams
Duration of Project	2011/4/1~2014/3/31 (36months)
Core Institution in Japan	Graduate School of Science, Tohoku University

Implementing Organizations

Country	Japan
Core Institution	Graduate School of Science, Tohoku University
Co-Chair (name and title)	Hirokazu Tamura (Professor)
Number of Cooperating Institutions	6
Cooperating Institutions	Research Center for Electron Photon Science, Tohoku University; High-energy Accelerator Research Organization; Yamagata University, Osaka Electro-Communication University, RIKEN Nishina Accelerator Center; Advanced Science Research Center, Japan Atomic Energy Agency
Country	United State of America
Core Institution	Thomas Jefferson National Accelerator Facility
Co-Chair (name and title)	Liguang Tang (Staff Scientist, Professor of Hampton Univ.)
Number of Cooperating Institutions	3
Cooperating Institutions	Hampton University, Florida International Univ., University of Puerto Rico
Matching Fund	Selected problems in hypernuclear physics

Country	Germany
Core Institution	Institute for Nuclear Physics, Mainz University
Co-Chair (name and title)	Josef Pochodzalla (Director, Professor)
Number of Cooperating Institutions	1
Cooperating Institutions	Giessen University
Matching Fund	MAMI operating budget; 7th Framework, HADRONPHYSICS2 (SPHERE)

Country	Italy
Core Institution	INFN Rome
Co-Chair (name and title)	Franco Garibaldi (Professor)
Number of Cooperating Institutions	3
Cooperating Institutions	INFN Bari, Università di Torino, INFN Torino
Matching Fund	INFN JLab12

Country	Czech
Core Institution	Nuclear Physics Institute, Academy of Science of Czech

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Co-Chair (name and title)	Petr Bydzovsky (Staff Scientist)
Number of Cooperating Institutions	0
Cooperating Institutions	
Matching Fund	Hadron and Baryonic systems

Result of Program Implementation

Based on the international collaboration on the hypernuclear spectroscopy with electron beams, Tohoku University drove two collaborative researches with Jefferson Lab (USA), Mainz University (Germany), INFN Rome (Italy) and theoretical division of NPI (Czech): namely, 1) spectroscopic study of Lambda hypernuclei with electron beams and 2) study of the strangeness nuclear physics with photon and electron beams. Analysis of JLab data gave new results on $^{12}_{\Lambda}\text{B}$, $^7_{\Lambda}\text{He}$, $^{10}_{\Lambda}\text{Be}$ and $^{52}_{\Lambda}\text{V}$. Some of results were already reported at international conferences and they triggered new calculation works and proposals of new experiments. At Mainz, feasibility of the new experimental technique of decay pion spectroscopy for electro-produced hypernuclei, has proven. We successfully observed a clear peak of $^4_{\Lambda}\text{H}$ which is quite important for discussion of charge symmetry breaking of ΛN interaction. Two international seminars at Kemer (Turkey) and Praha (Czech) were organized under this program. The third international school for strangeness nuclear physics (SNP school 2014) was successfully performed at Tokai and Sendai. These seminars and school worked effectively to encourage young scientists and stimulated senior scientists as well by exchange opinions with young scientists.

Achievements in FY2013 (Self Review)

With strong collaboration with core institutes, international research exchanges, joint researches, international seminars and young researchers' education program were successfully carried out as previous years. Especially, at Mainz, flexible beamtimes allow us timely a feasibility study of new experimental techniques such as the decay pion spectroscopy of electro-produced hypernuclei and new GEM detector dedicated for hypernuclear study. At Jefferson Lab, the combined hypernuclear collaboration of previous Hall-C and Hall-A hypernuclear programs are now designing a new future experiment. This year J-PARC and ELPH-Tohoku recovered from the earthquake and started to deliver beam in Japan. With this core-to-core program, we strengthen our collaboration to explore the potential of electro-photo reactions in the strangeness nuclear physics and explore future possibility of hypernuclear study with hadron beams as well as electron beams..

Future Plan (Measures toward Achieving Research Objectives)

This core-to-core program was finished in FY2013, but other countries matching projects are still on going. We, Japanese group, established and lead the strong international collaboration platform on the strangeness nuclear physics based on this core-to-core program. In order to keep our activities and leadership in the international collaborations even after finishing this core-to-core program, we are trying to get financial supports from any funding sources.