Structuring of Database for ICCHIBAN Experiments and Brief Reports on the Ongoing Experiments

H. Kitamura\textsuperscript{1}, Y. Uchihori\textsuperscript{1}, N. Yasuda\textsuperscript{1}, S. Kodaira\textsuperscript{1}, I. Jadrnickova\textsuperscript{2}, E. Benton\textsuperscript{3}, M. Hajek\textsuperscript{4}, T. Berger\textsuperscript{5}
on behalf of ICCHIBAN Working Group and Participants

\textsuperscript{1} NIRS, Japan, \textsuperscript{2} NPI, Czech Rep., \textsuperscript{3} Oklahoma State University, USA, \textsuperscript{4} ATI, TU Vienna, Austria, \textsuperscript{5} DLR, Germany
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ICCHIBAN Project
InterComparison for Cosmic-rays with Heavy Ion Beams At NIRS

• Motivation:
  – Recommendation of intercomparison of space radiation dosimeters in 4th WRMISS (http://wrmiss.org/workshops/fourth/dir.pdf)

• Aims:
  – Determine the response of space radiation dosimeters to heavy ions of charge and energy similar to that found in the galactic cosmic radiation (GCR) spectrum.
  – Compare response and sensitivity of various space radiation monitoring instruments. Aid in reconciling differences in measurements made by various radiation instruments during space flight.
  – Establish and characterize a heavy ion “reference standard” against which space radiation instruments can be calibrated.
## History of ICCHIBAN Experiments

<table>
<thead>
<tr>
<th>Year</th>
<th>NIRS-HIMAC</th>
<th>Other Accelerators</th>
<th>Space Intercomparison (SI)</th>
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<tbody>
<tr>
<td>1999</td>
<td>Recommendation of intercomparison of space radiation dosimeters in 4th WRMISS</td>
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<td>2002</td>
<td>1st ICCHIBAN</td>
<td>2nd ICCHIBAN</td>
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<td>2003</td>
<td>3rd ICCHIBAN</td>
<td>4th ICCHIBAN</td>
<td>1st Proton ICCHIBAN (Loma Linda Univ.)</td>
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<td>5th ICCHIBAN</td>
<td>6th ICCHIBAN</td>
<td>1st NSRL ICCHIBAN (NSRL, BNL)</td>
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<td>7th ICCHIBAN</td>
<td>8th ICCHIBAN</td>
<td>1st CERF ICCHIBAN (CERF, CERN)</td>
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<td>2010</td>
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**SI-1**
Jan. 29 to Apr. 30, 2004 (91.5 days)

**SI-2**
May 12 to Oct. 22, 2007 (163 days)

**SI-3 / CR-39 ICCHIBAN**
May 14 to Oct. 24, 2008 (163 days)
Concept of ICCHIBAN Data Base

• “To aid in reconciling differences in measurements made by various radiation instruments”, the ICCHIBAN working group (ICWG) decides to collect and summarize the results from past ICCHIBAN experiments.

• Submitted groups
  – Passive: SCK-CEN, NPI
  – Active: TEPC(ARC), DB-8 (IBMP), Liulin (IBMP), Liulin-5 (STIL-BAS)

• Collected data will be opened on the internet for ICCHIBAN participants.
Parameters for Active Detectors

• LET Distribution
  – Fitted to Gaussian distribution
  – FWHM(calculated from sigma), mean value, etc.

• Dosimetric Parameter
  – Dose, dose equivalent

• LET distribution
  definition of parameters, see Yukio’s presentation in 13th WRMISS,
  http://wrmiss.org/workshops/thirteenth/Uchihori.pdf
Parameters for Passive Detectors

• Luminescence detectors (TLD, OSL, Glass, ...)
  – Dose
  – TL-efficiency

• Track detectors (PNTD, Nuclear Emulsion, ...)
  – Dose, Dose Equivalent
  – Average Track Diameter, Bulk Etch (for PNTD)
  – Fluence

• Combined data
  – Dose, Dose Equivalent
Web site
(Under constructing)

Language: PHP
Database: PostgreSQL
On-going ICCHINBAN Experiments

- CR-39 ICCHIBAN / 3rd Space Intercomparison (SI-3)
- 2nd Proton ICCHIBAN
  - Yukio will talk about it on 10th September.
CR-39 ICCHIBAN

• Significant differences (25 to 35%) exist in the average quality factor from particles of \( \text{LET}_{\infty} \approx 10 \text{ keV/\( \mu \)m} \) measured in CR-39 exposed in low-Earth orbit (LEO) and these differences are too large.

• The discrepancy in average quality factor measured by different laboratories from controlled irradiations carried out as part of the ICCHIBAN project tend to be significantly smaller (10 to 20%).

• Why? What different?

• To resolve this difference, we promoted two CR-39 exposure experiments: Ground-base experiments using accelerator beams and space experiments on ISS.

CR-39 ICCHIBAN

• Space experiment
  – Period
    • May 14, 2008 to Oct. 24, 2008 (163 days)
  – Location
    • Russian Service Module
  – Status
    • Detectors already were sent to the participants

• Baseline beam experiments on Ground
  – Heavy Ions using the NIRS-HIMAC accelerator
    • Ions: C, Ne, Si, Ar, Fe, Kr
    • LET in water: 13 – 500 keV/um
  – Status
    • ICWG will finish exposures at October 2009.
    • After then, we will send them to participants.
Call for Data !!

• Please send the data until the end of 2009 (31th Dec. 2009).
  – Summarizations of the past experiments for database
  – Space Intercomparison 2
    • ICWG will send the announcement soon.
  – CR-39 ICCHIBAN (SI-3)

• For Baseline experiment of CR-39 ICCHIBAN, the dead line is 31th March 2010.
Summary

• ICWG started summarizing the past experiments data as the database.
• The database will be opened on the internet.
• Please send the data (including CR-39 ICCHIBAN & SI-2) until the end of 2009.