Summary of Japan M&S Group Activities

June 25, 2015
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for the Japan M&S group
Status of A/I in 2014-10-17 TIM

• A/I: Preparation of benchmark data sets for particle tracking:
  ➢ A summary (an Excel file under caletgs2:~yosui/Dist) of the simulation data sets was updated (Y.Akaike).
CAL CAD model revision
(M&S Telecon on March 30, 2015)

• CAL CAD model Rev.18 with Cosmos7.645 and Epics9.163 or later (Y.Akaike).

• Updates of the repository of CALET_EPICS in SVN (rev. 18->21). The detector configuration is not changed. The updates are in source codes (Y.Akaike).
  – rev.19: Application of quenching effect to secondary particles
  – rev.20: Update of a conversion program of EPICS raw data to UnifiedOutput_v1.0
  – rev.21: Adding information of elastic collision and stop position of an incident particle

• CAD STEP files of the entire CALET with reduction will be available.
On-orbit simulation

• Solar Array Panels

We continue the requirement for just rough information of materials of the solar array panels (e.g. frames, hinges) of the ISS.
Instrument performance

- Upgrade of Application of a Mahalanobis-Taguchi method for e/p separation will be presented in this TIM (K.Yoshida).
- Electron tracking using a Kalman filter technique will be presented in this TIM (K.Yoshida).
- Gamma-ray tracking procedure, background particle rejection, and Point Spread Function for gamma-ray observations are under investigation (T.Niita, Y.Akaike).
- FEC response
  - Y.Shimizu will start by considering how to share the program and present the parameters.
Instrument Performance: Improvement of Proton tracking (M. Ichimura)  
(M&S Telecon on March 30, 2015)

Tracking efficiency of protons with
• Angular resolution: 0.18 deg (width of 68%)
• Position resolution: 0.26mm at IMC Top layer

TIM version (Oct. 15, 2014)

Revised version

Improvement of the tracking efficiency (<80%) in the high energy region above 10 TeV is under study.
Observation performance

• Development of a conversion program from CALET Level-1 format to FITS format by using C++ with CCFits library (M.Mori)
  – A conversion program of the Level-2 format to FITS format will be developed after the agreement of the Level-2 format (M.Mori).

• Study of electron+positron and gamma-ray observations from Kaluza-Klein dark matter will be presented in this TIM by M.Mori.
Observation Performance:
Sidereal anisotropy and count rate estimation
( K.Munakata)
(M&S Telecon on March 30, 2015)

<table>
<thead>
<tr>
<th>E (TeV)</th>
<th>proton (&gt;E)</th>
<th>flux ((/(m^2<em>sr</em>s)))</th>
<th>c/5y</th>
<th>c/5y/45deg RA</th>
<th>err (%)</th>
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<td>1</td>
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<td>3.78E+04</td>
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<td>1.14E+07</td>
<td>1.42E+06</td>
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</tbody>
</table>

Detection of proton anisotropy is possible with 2 sigma level
Observation Performance: The Solar Modulation (11yr variation) of GCR protons (S. Miyake)

**Our study**
- Solar modulation of Galactic cosmic rays
- Numerical simulation using the stochastic method
- Observed parameters ($V_{SW}$, $B_{1AU}$, $\alpha$) have been assumed

**Present Results**
- The amplitude of energy spectrums are consistent with the observations obtained by BESS and PAMELA.
- The charge dependence of the flux is reproduced.
- The integral flux during cycle 24/25 will be 30% higher than the flux during cycle 22/23.