Geophysical Research Abstracts,
Vol. 10, EGU2008-A-10481, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-10481
EGU General Assembly 2008

Lunar Exploration Neutron Detector (LEND) for NASA Lunar Reconnaissance Orbiter

A. Sanin (1), I. Mitrofanov (1), W. Boynton (3), L. Evans (4), K. Harshman (3), M. Litvak (1), R. Sagdeev (2), V. Shevchenko (5), R. Starr (6), J. Trombka (7)

(1) Space Research Institute, Moscow, Russia, (2) University of Maryland, Collage Park, USA, (3) University of Arizona, Tucson, USA, (4) Computer Science Corporation, Washington, USA, (5) Sternberg Astronomical Institute, Moscow, Russia, (6) Catholic University, Washington, USA, (7) Goddard Space Flight Center, Greenbelt, USA

The Russian-made, Russian-funded instrument LEND (Lunar Exploration Neutron Detector) has been selected for NASA Lunar Reconnaissance Orbiter mission to provide the global search of hydrogen distribution through 1 – 2 meters of lunar subsurface from 50 km circular polar orbit of LRO. LEND is able to provide high spatial resolution mapping of epithermal neutrons with collimated neutron detectors. It is able to detect hydrogen-rich spot at a pole with sensitivity about 100 ppm of hydrogen with spatial resolution of 5 km (Half Width at Half Maximum) and to produce global mapping of hydrogen content with resolution of 5 – 20 km.

LEND have a full set of sensors for thermal, epithermal and high energy neutrons to provide data for neutron component of radiation environment in the broad range of more than 9 decades of energy. The primary type of LEND sensor is ^{3}He counter, which is used for 8 of 9 detectors. The ^{3}He nucleus has large cross section to capture thermal and epithermal neutrons. The Cd shield around five detectors absorbs neutrons with energies below $\sim$ 0.4 eV, which exclude thermal neutrons from detection. Collimating modules around four ^{3}He counters effectively absorb neutrons that have large angles of incidence with respect to the normal to the surface of the Moon and provide high spatial resolution of LEND for mapping. The second type of LEND neutron sensor is sthylbene scintillation detector, which is effective for registration of high energy neutrons (0.3 – 15.0 MeV).