VERIFYING the LEND/LRO CAPABILITIES in FLIGHT and on the GROUND **M.L Litvak[1]** , I.G. Mitrofanov[1] , A.B. Sanin[1], V.I. Tretyakov[1], A.S. Kozyrev[1], A.V. Malakhov[1], M.I. Mokrousov[1], A.A Vostrukhin[1], D. V. Golovin[1], A.B. Varenikov[1], V. N. Shvecov[2], W.V. Boynton.[3], K Harshman[3], R.Z. Sagdeev[4], G. Milikh[4], G. Chin[5], J. Trombka[5], T. Mcclanahan[5], R. Starr[6], L. Evans[7], V. Shevchenko[8], [1]Space Research Institute, RAS, Moscow, 117997, Russia, litvak@mx.iki.rssi.ru , [2]Joint Institute for Nuclear Research, Dubna, Russia, [3]**University of Arizona, Tucson, AZ, USA, [4]University of Maryland, College Park, MD, USA, [5]Goddard Space Flight Center, Greenbelt, MD, USA., [6]Catholic University, Washington, DC, USA, [7]Computer Sciences Corporation, Glenn Dale, MD, USA. [8]Sternberg Astronomical Institute of Moscow State University, Moscow, Russia.**

Introduction: The Lunar Exploration Neutron Detector (LEND) is installed onboard Lunar Reconnaissance Orbiter (LRO) and is capable for mapping hydrogen content over the entire Moon and on testing the presence of water-ice deposits at the bottom of permanently shadowed craters at the lunar poles. To accomplish these tasks LEND uses neutron spectrometry methods based on the orbital mapping of Moon neutron flux in wide energy range starting from thermal neutrons up to high energy neutrons above 10 MeV [1-3]. LRO mission has started in June 2009 and now it has completed commissioning phase and approaching to the end of primary mapping phase. First LEND data has already been published in Planetary Data System.

Data Analysis: Here we have focused on the verification of LEND capabilities including measuring of epithermal and fast neutron flux from the Moon with enhanced spatial resolution providing distinguishing most H-rich spots on Southern pole with sizes 10-20 km. We plan to support it with results of ground calibrations with estimation of LEND point spread function (figure 2) and estimation of LEND local background derived from onflight measurements in cruise, orbit insertion and on the elliptical orbit at the commissioning phase.

Results: Conclusions are drawn that capabilities of LEND correspond to original LRO mission requirements (see [3]), and that recently published critism of this instrument (see [4]) is not supported by observational data.

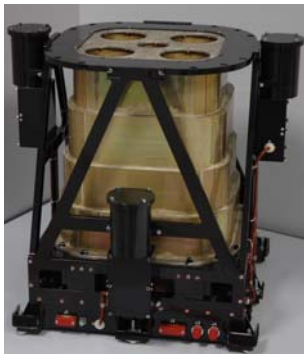

Figure.1 LEND/LRO instrument.

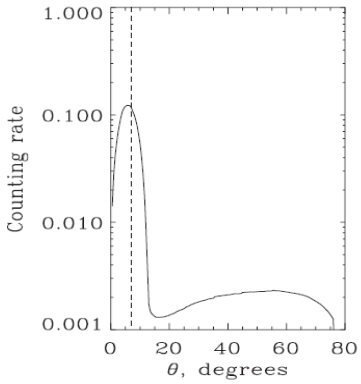

Figure. 2. Differential plot of LEND "collimation curve," as the distribution of counts for detected neutrons from the lunar surface as a function of the angle from the axis of the instrument and as the number of counts for neutrons with directions within the angle.

References:

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[4] Lawrence, D. J. et al Performance of Orbital Neutron Instruments for Spatially Resolved Hydrogen Measurements of Airless Planetary Bodies Astrobiology, Volume 10, Issue 2, pp. 183-200.