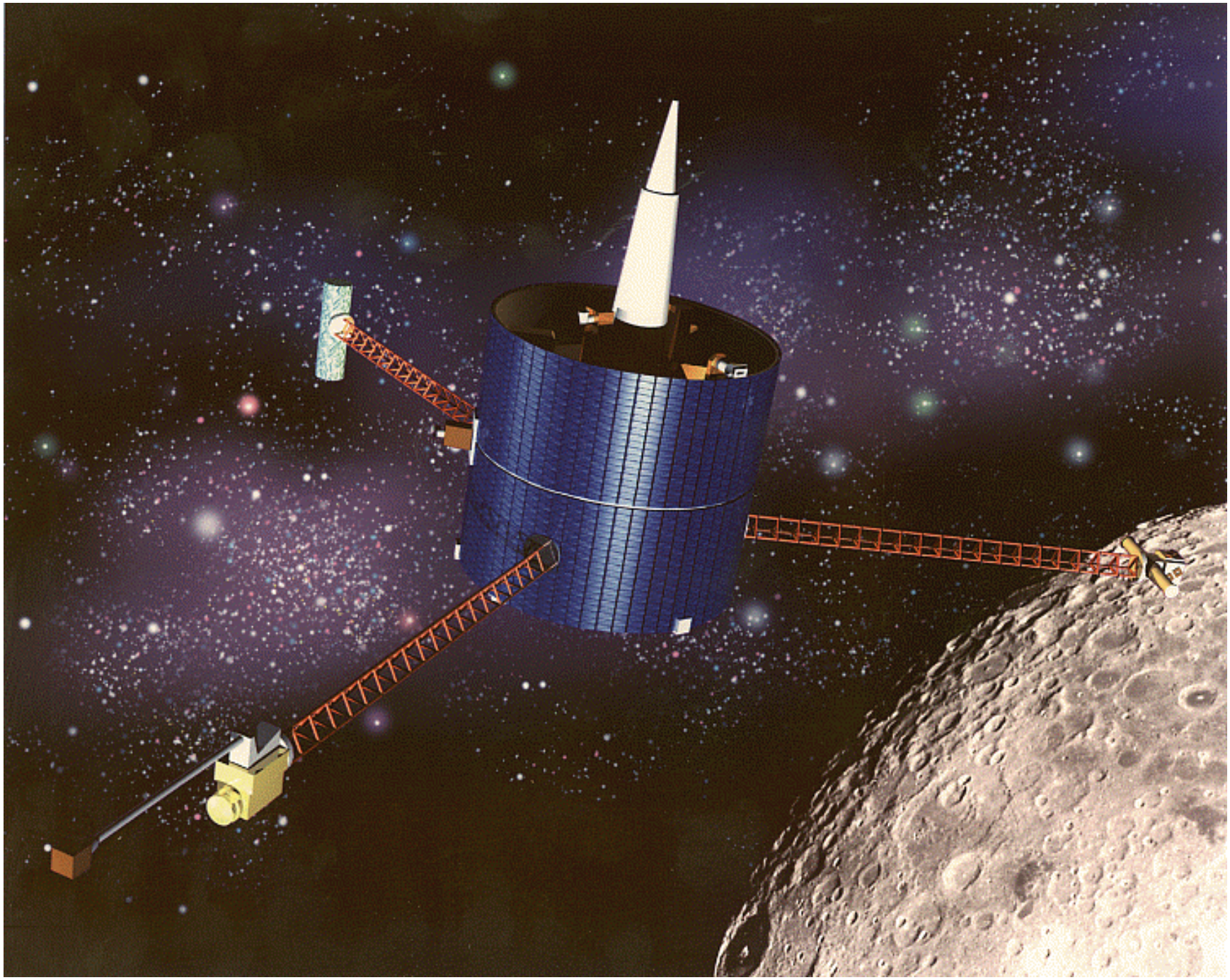
Neutron Spectroscopy

Bill Feldman



Response Function of Lunar Prospector Neutron Spectrometer

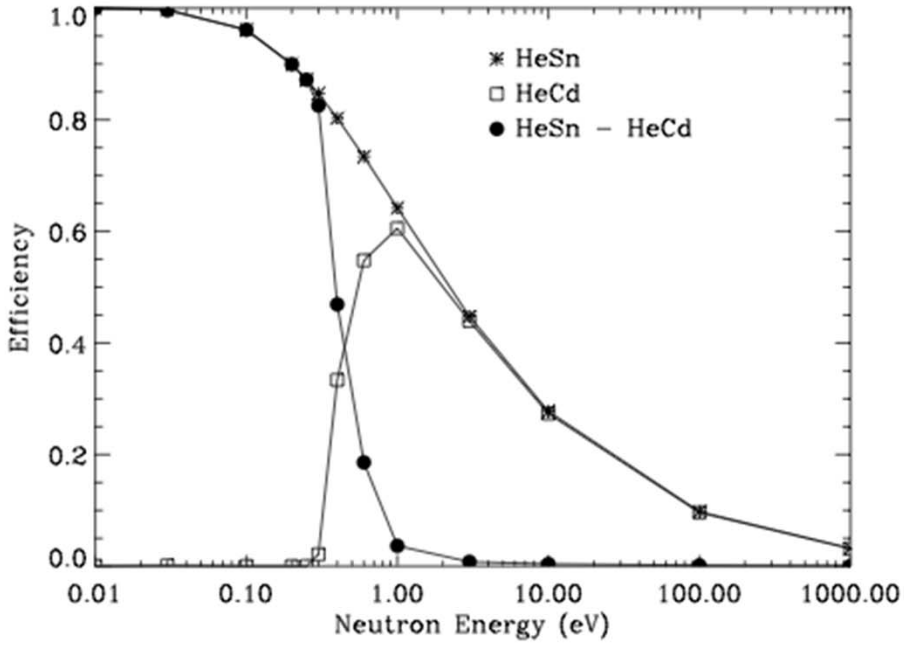


Figure 11. The response of the Sn- and Cd-covered ^{3}He gas proportional counters calculated for neutrons incident at right angles to the counter symmetry axis.

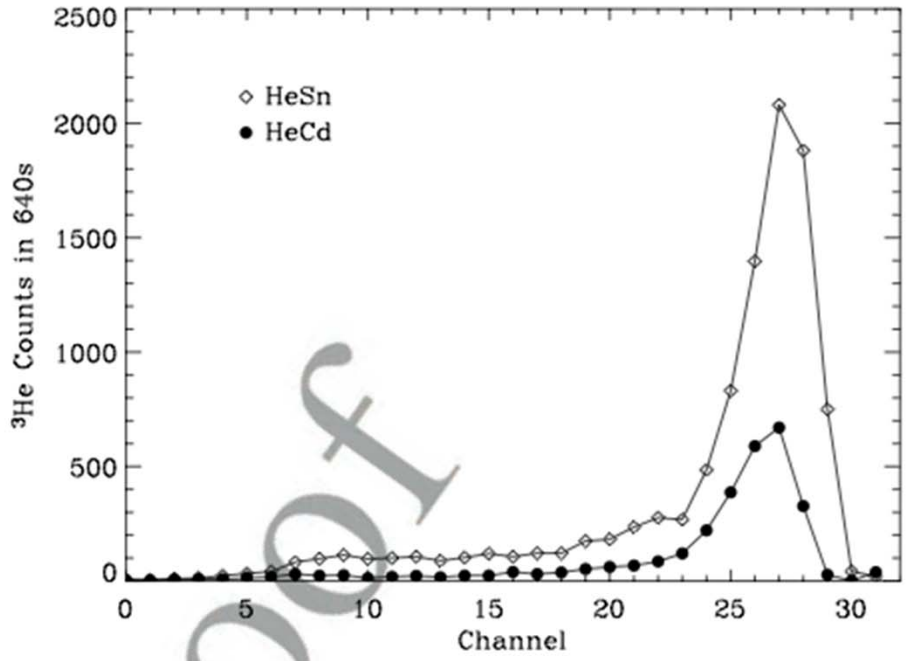
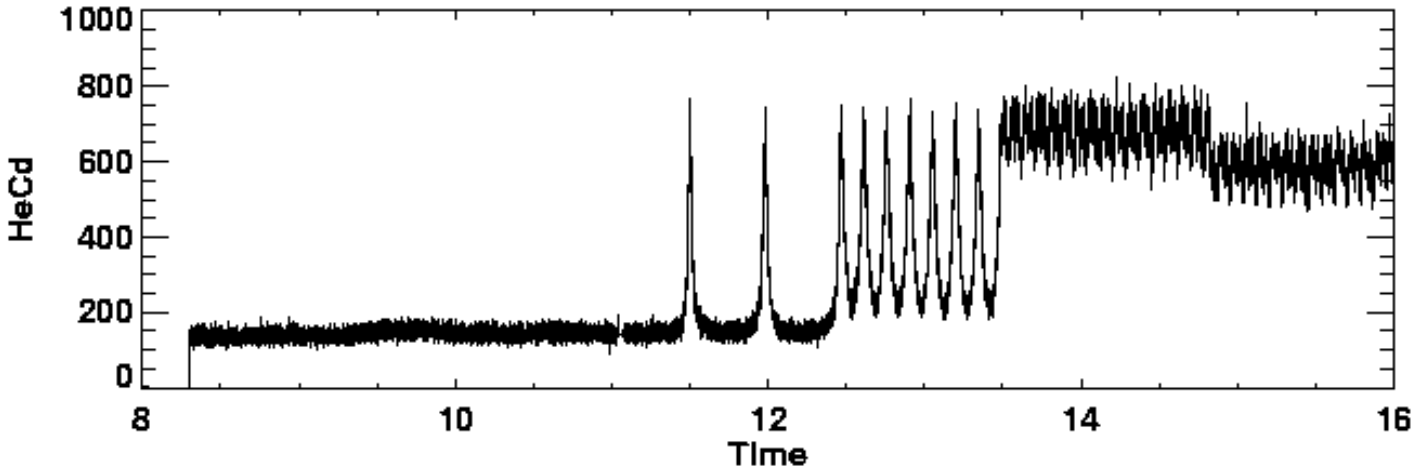
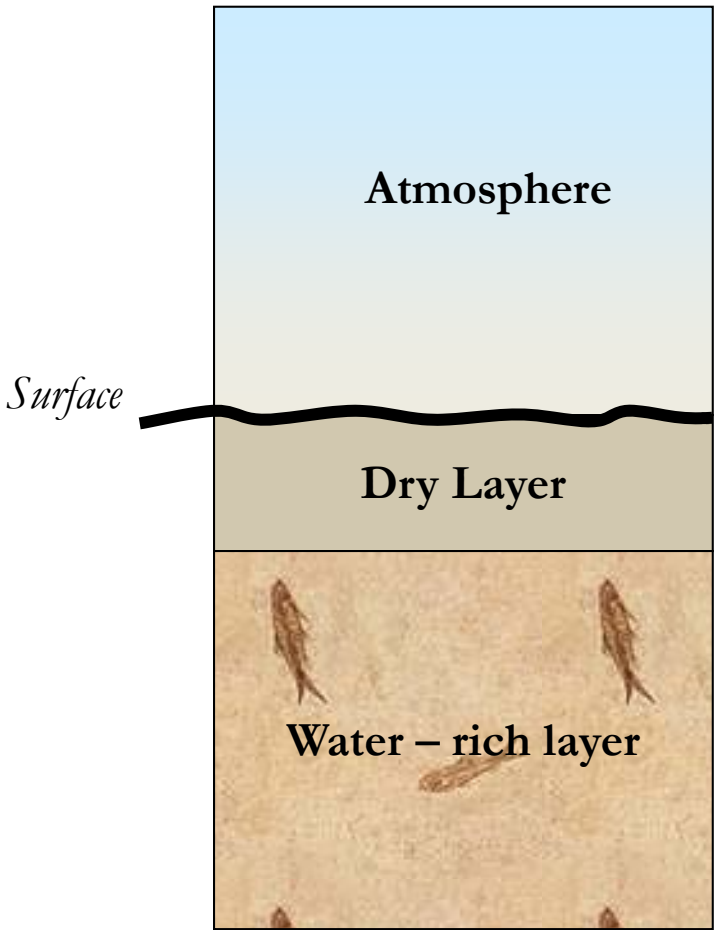


Figure 13. Measured pulse-height spectra of the response of both the tin- (HeSn) and Cd- (HeCd) covered gas proportional counters to neutrons coming from the mini neutron pile at Los Alamos and incident on both counters at right angles to their symmetry axes.

Lunar Prospector Orbit Insertion about the Moon



Burial depth model



Standard composition
16 g / cm^2

3 parameter model

Wup % of H_2O
D Depth

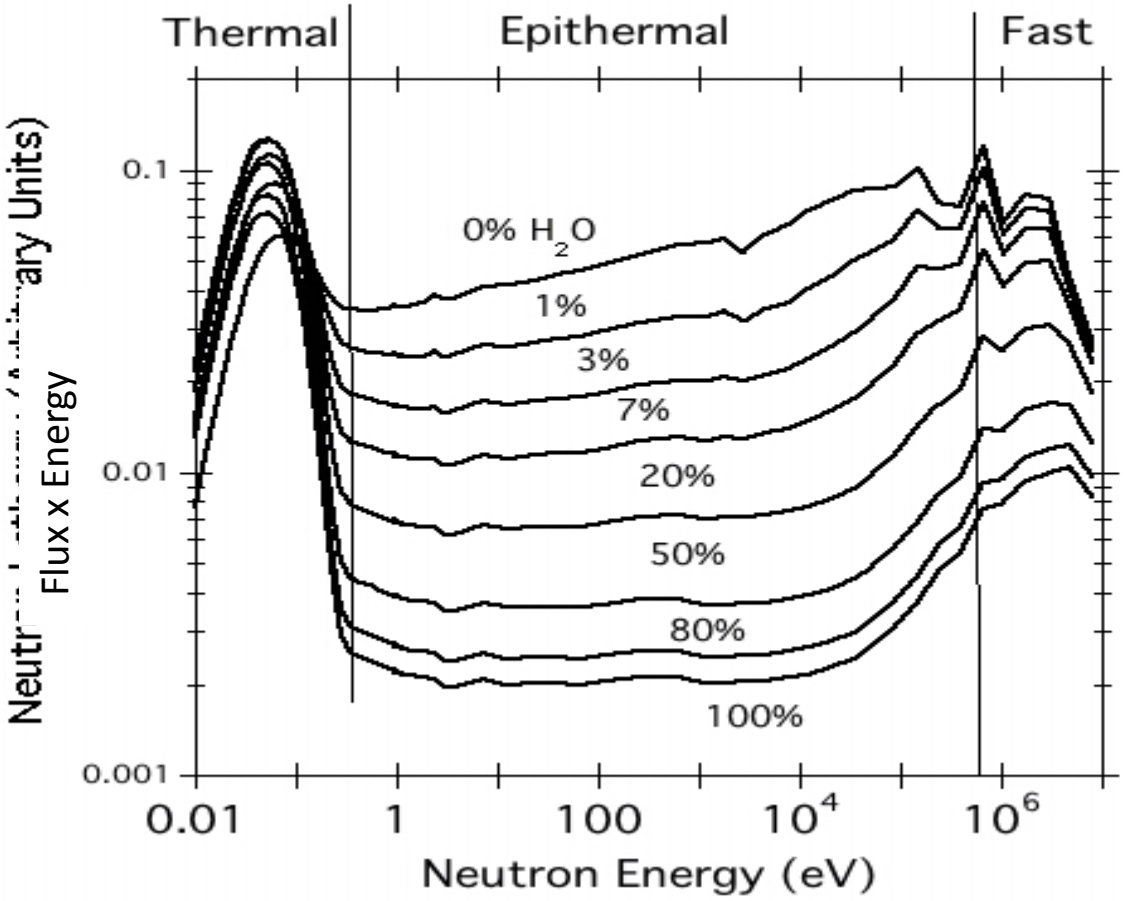
Wdn % of H_2O
Infinitely deep

Given composition

The burial depth, D, responds to the average atmospheric water-vapor density and the frost-point temperature

Simulated Neutron leakage energy spectra for a range of soil water content

One Dimensional Model



Lawrence et al., 2011

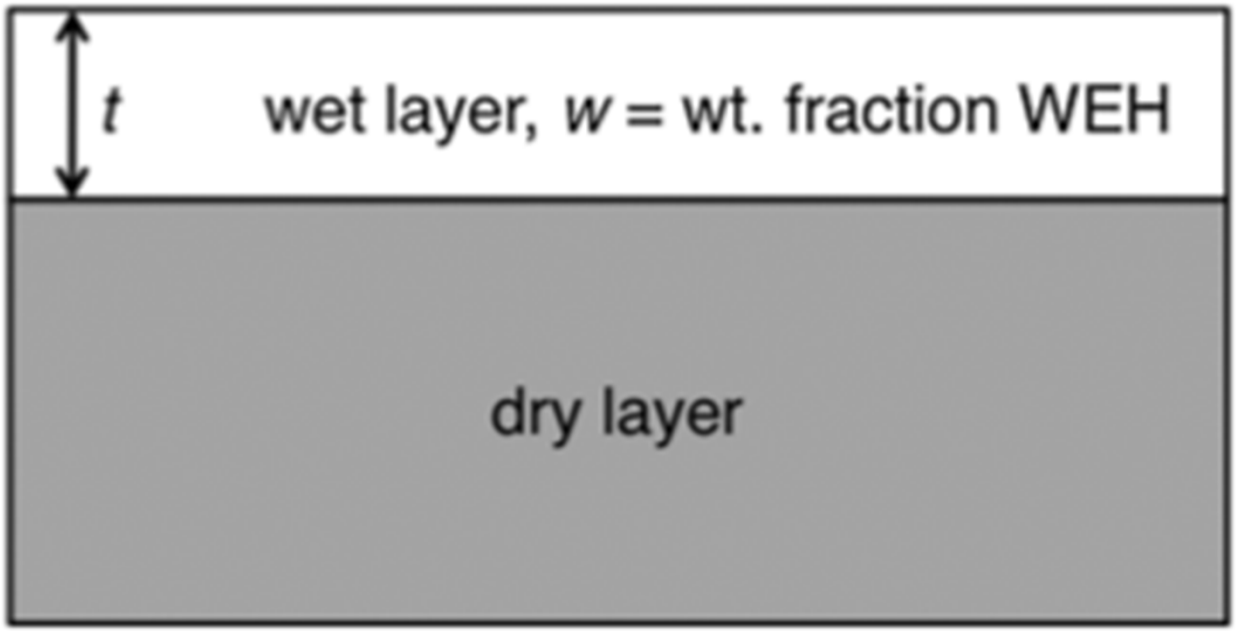


Figure 1. Layering stratigraphy being considered in this paper, where a top layer with thickness t and water equivalent hydrogen (WEH) abundance w overlies a completely dry layer.

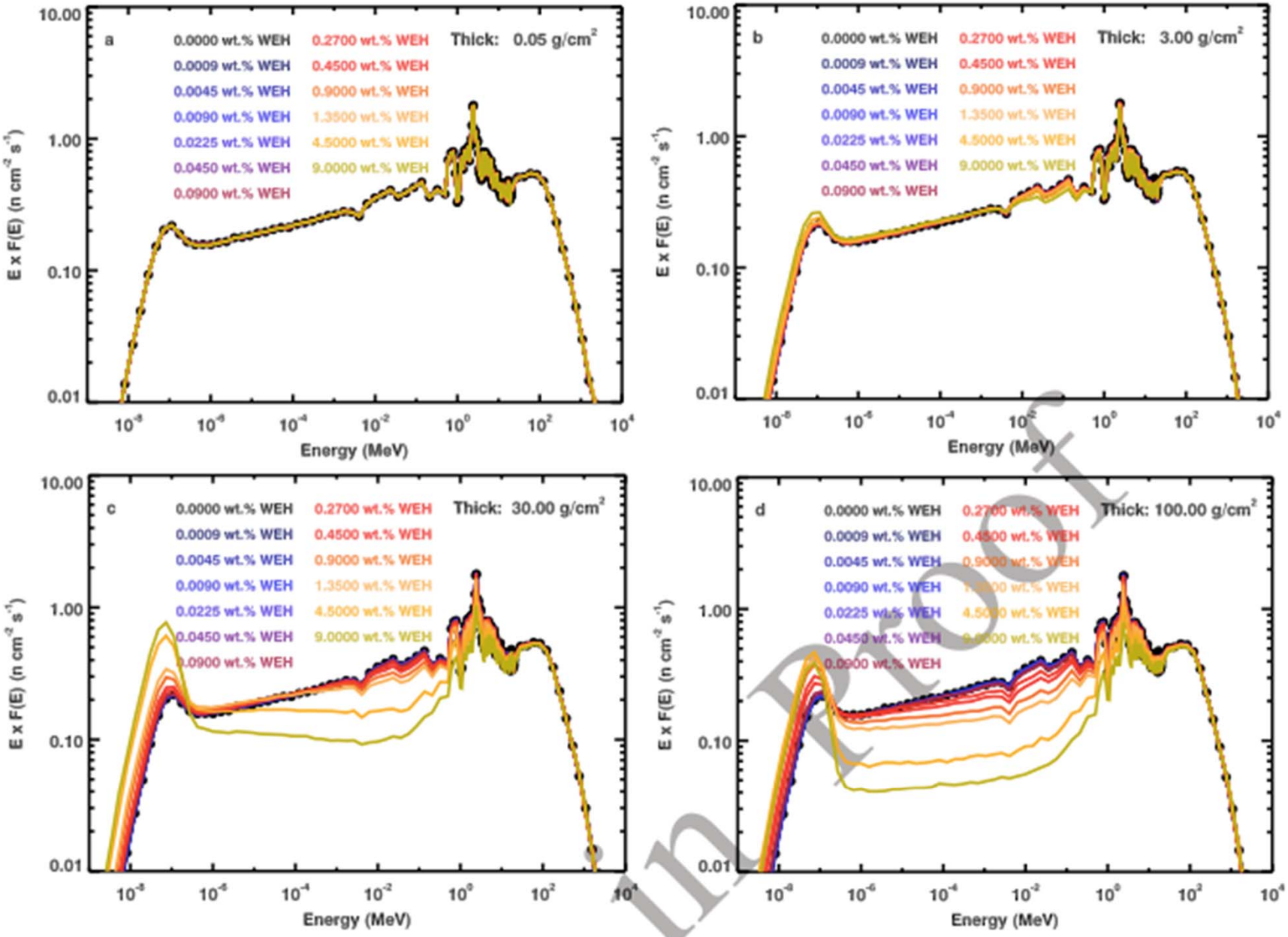
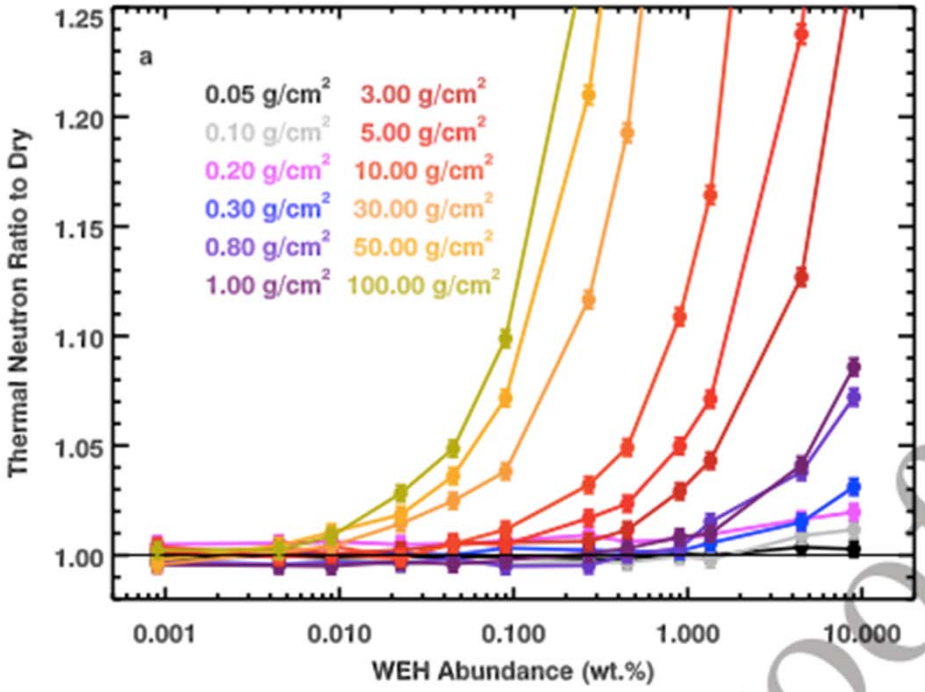
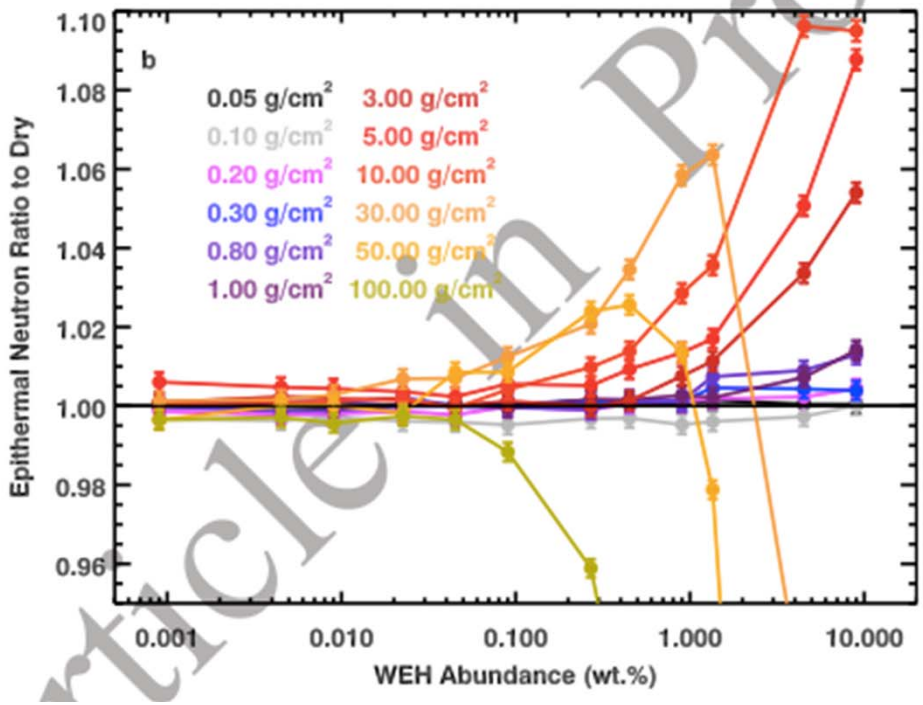


Figure 2. Modeled neutron fluxes for the two-layer stratigraphy with a wet layer on top and dry layer on bottom for different top layer thicknesses of (a) 0.05, (b) 3, (c) 30, and (d) 100 cm. For each part, varying amounts of WEH abundances are represented by different colors.





Best one-dimensional determination of Water-Equivalent Hydrogen from the Lunar Prospector Neutron Spectrometer Epithermal smoothed counting rates