

Data Unfolding for the Helium and Lead Observatory

The Helium and Lead Observatory (HALO) at SNOLAB is a supernova neutrino detector and a member of the Supernova Early Warning System (SNEWS). The detector consists of 128 ^3He counters embedded in a 79-ton lead matrix. Depending on energy, neutrino interactions with lead may generate single (1n) or double (2n) neutron events. The relative rates of 1n and 2n events are sensitive to supernova neutrino spectra. It is therefore important to evaluate HALO's detection efficiency and to develop a method for reconstructing true 1n and 2n numbers from detected events. The matrix-inversion unfolding produces unphysical results and large uncertainties. A Bayesian algorithm removes unphysical results and tuning the prior to the expected range of supernova and neutrino oscillation parameters reduces uncertainty. A figure of merit is developed that evaluates the effectiveness of the unfolding over a range of supernova distances. HALO-1kT, the proposed 1 kiloton upgrade at LNGS, is also evaluated.

Authorship annotation

for the HALO collaboration

Session and Location

Wednesday Session, Poster Wall #7 (Robert-Schumann-Room)

Poster included in proceedings:

yes

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Track Classification: Poster (not participating in poster prize competition)