Contribution ID: **548** Type: **Poster**

# Measurements from HALO

*Wednesday, August 30, 2023 3:55 PM (1 minute)*

HALO, the Helium and Lead Observatory, has been operating at SNOLAB for eleven years as a low-maintenance, high-livetime supernova neutrino detector. Since October 2015 HALO has been providing low threshold and very low latency supernova alarms to the SuperNova Early Warning System (SNEWS) coincidence servers. The HALO detector is principally composed 79 tonnes of lead, from a decommissioned cosmic ray station, and is instrumented by 368 m of SNO's ultra-low activity He-3 neutron counters. Supernova neutrinos interacting with the lead target may produce one or two neutron emission through CC or NC excitation of the lead nuclei. HALO detects these neutrons with an average efficiency of 28% and an extended burst of detected neutrons would be consistent with a galactic supernova explosion. The background detected neutron rate in HALO, from various sources, is 15 mHz. Two prompt sources of neutron bursts are muon spallation events (the low cosmic ray muon rate in SNOLAB results in close to two muons per day traversing HALO), and spontaneous fission of U-238 built into HALO. With a neutron thermalization and capture time of 200 usec these prompt bursts are not confused with supernova candidate events. As a large, low-background, and long-running lead-based neutron detector there is an interest in exotic prompt signatures that HALO might have sensitivity to. The collaboration will present its first, preliminary, neutron multiplicity distribution from a reasonably large dataset.

## Submitted on behalf of a Collaboration?

Yes

**Primary author:** Dr SEKULA, Stephen (SNOLAB and Queen's University)

**Co-author:** Prof. VIRTUE, Clarence (Laurentian University / SNOLAB)

**Presenter:** Dr SEKULA, Stephen (SNOLAB and Queen's University)

**Session Classification:** Poster session

**Track Classification:** Neutrino physics and astrophysics