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A Supernova Calibration Source for SNO+

Monday, 3 June 2019 13:45 (15 minutes)

Only one supernova neutrino burst has ever been detected, and the detection of additional neutrinos from galactic core-collapse supernovae are expected to provide insight on the supernova explosion mechanism. One candidate for detecting supernova neutrinos is SNO+, a multipurpose ultra-low background particle detector. Within SNO+, a galactic supernova neutrino burst is expected to generate an unprecedented rate. Thus, it is necessary to stress-test and optimize the SNO+ data acquisition and electronics so that a supernova signal can be reliably read out. For this purpose, a Supernova Calibration Source is under development to mimic the light expected from supernova neutrino interactions [1]. Using one-dimensional simulated supernova neutrino datasets [2, 3], light profiles representing neutrino interactions are calculated and realised using a laser diode light source delivered into the detector via fibre optics and a deployed light diffuser. This talk will focus on the software conversion of neutrino datasets to light profiles, which define the light intensity and timing in the calibration source.

[1] C. Darrach. The SNO+ Supernova Calibration Source: Development and Testing. MSc Thesis, Laurentian University, Sudbury, ON, Canada (2016)
[2] L. Hüdepohl, B. Müller, H.-T. Janka, A. Marek, and G. G. Raffelt. Phys. Rev. Lett. 104, 251101 (2010)
[3] A. Mirizzi et al. Rivista del Nuovo Cimento Vol. 39 N. 1-2 (2016)

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