

Upcoming Weak Interaction Discussion Group Talk

Tuesday, May 9, 2017

12:00 PM

WL/EAL-108

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Calculations and Measurement of the Rayleigh Scattering Length of the Scintillation Light in Liquid

Like all the noble elements, argon is a scintillator, i.e. it produces light when exposed to radiation. Large liquid argon detectors have become widely used in low background experiments, including dark matter and neutrino research. However, the index of refraction of liquid argon at the scintillation wavelength has not been measured and the previous Rayleigh scattering length calculations disagree with measurements. We introduce a new calculation using previously measured data in liquid argon to extrapolate the optical properties at the scintillation wavelengths using the Sellmeier dispersion relationship. Further, we tested these calculations using a test stand, designed and constructed at Royal Holloway, to experimentally verify the scattering length of liquid argon. This experiment consisted of a long tube of liquid argon with window on one end and photomultiplier tube on the other side. The argon was scintillated at different positions using a collimated, external gamma source. The scattering length was calculated by examining the amount of light detected as a function of position from the window yielding a final result of 58 ± 4 cm at a temperature of 90 K.

Lunch will be served starting at 11:45 a.m. outside the WL/EAL-108 Conference Room.

Host: Serhan Tufanli

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