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Building an atomic source for the Project 8 experiment

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There have been significant gains in characterizing neutrino properties in recent years, however the absolute neutrino mass scale continues to be elusive.

The Project 8 collaboration seeks to probe this quantity directly via kinematic analysis of tritium beta decay, using the cyclotron radiation emission spectroscopy (CRES) technique. In order to make neutrino mass measurements with a design sensitivity of 40meV, the Project 8 experiment must use atomic tritium. To create an atomic tritium source suitable for the Project 8 experiment, molecular tritium is thermally dissociated into atomic tritium, which is then state selected and cooled.

I will report on the current status of the atomic source development, covering subsystems for dissociation in coaxial cracker design, followed by accommodation from a surface which is held at O(10) K. The requisite low-field-seeking states are then magnetically guided, evaporatively cooled, and injected into the trap where the atoms decay.

Submitted on behalf of a Collaboration?

Yes

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