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Hardware Design for Atomic Tritium in Project 8[1] ALEC LINDMAN, Johannes Gutenberg-Universitt Mainz, PROJECT 8 COLLABORATION — Project 8 is a phased experiment using tritium beta decay to investigate the absolute neutrino mass. Good energy precision, high statistics, and well-controlled systematics are required to reach $m_{\bar{\nu}_e} \leq 40$ meV. Our technique, Cyclotron Radiation Emission Spectroscopy, has already achieved eV-scale resolution at 17.8 keV, near the tritium endpoint. Project 8 was the first to observe the fW-scale cyclotron radiation from individual electrons. The event rate in a CRES experiment scales with volume; we will instrument our fiducial volume with a spatially-resolving antenna array, eliminating pileup even at high activity. Project 8 will be the first laboratory neutrino mass experiment to use atomic tritium. A decay in a tritium molecule excites rovibrational states that smear the observed energy by 1 eV. The decay of atomic tritium, however, has an energy smearing of just 0.1 eV. Our baseline design calls for trapping the 30 mK atomic tritium in a 2 T-deep, 10+ m^3 superconducting magnetic bottle. I will discuss our phased approach to building this large-volume atomic tritium CRES experiment, with emphasis on demonstration of production and handling techniques for the recombination-prone tritium atoms.

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Alec Lindman
Johannes Gutenberg University Mainz

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