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Bayesian Analysis of Project 8's Sensitivity to the Neutrino Mass Scale and Ordering[1] TALIA WEISS, Yale University, PROJECT 8 COLLABORATION — This talk presents Bayesian procedures for evaluating (or "calibrating") predictions of an experiment's sensitivity to both continuous and discrete parameters. We apply these procedures to Project 8, an experiment which aims to determine the absolute neutrino mass scale from the tritium beta decay spectrum. We evaluate sensitivity predictions by computing true and false "claim rates" for a group of pseudo-spectra, each generated after sampling parameters from priors to weight claim rates by the probabilities of obtaining different spectra. The data are analyzed using a new Bayesian model of the beta spectrum. For a design scenario under consideration, we find Project 8 could achieve its goal of measuring the electron-weighted neutrino mass within 40 meV (90% credibility). Masses > 500 meV could be measured within ≈ 5 meV. We validate our projections by showing that 90% credible intervals contain the true neutrino mass for (90 ± 2)% of datasets. In addition, we find that a next-generation beta decay experiment can potentially constrain the mass ordering. In some cases, an analysis with two neutrino states can reveal that the ordering is inverted, an unobtainable result for the traditional single-neutrino approach to beta decay analysis.

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