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Gleaning the ßß decay half-life of ⁹⁶Zr from billion year old zircons ADAM MAYER, Department of Physics and Astronomy, University of Calgary, DIETER FREKERS, Institut für Kernphysik, Westfälische Wilhelms-Universität, Münster, Germany, MICHAEL WIESER, ROBERT THOMPSON, Department of Physics and Astronomy, University of Calgary, JENS DILLING, TRIUMF, Vancouver, British Columbia — The decay of 96 Zr is of notable interest as a $\beta\beta$ decay candidate. Wieser and DeLaeter determined its $\beta\beta$ decay half-life by measuring an isotopic anomaly of the ⁹⁶Mo daughter in ancient zircons, yielding a value of $0.94(32) \times 10^{19}$ a. More recently, the NEMO collaboration measured the half-life by a direct count rate measurement to be $2.4(3) \times 10^{19}$ a, twice as long as the geochemical measurement. We aim to study this discrepancy through a series of experiments combining nuclear physics and geochemical techniques. We are measuring the amount of daughter product of the $\beta\beta$ decay of ${}^{96}\text{Zr} \rightarrow {}^{96}\text{Mo}$ in ancient zircons with ages from 500 Ma to 2.5 Ga using modern chemical preparation techniques and instrumentation. The zirconium silicates, which have remained a closed system over their lifetimes, are especially suitable for this investigation due to their high zirconium content and the low natural molybdenum abundance. This makes it possible to detect the small amount of accumulated decay product. These measurements are being performed in conjunction with beta decay Q-value measurements at the University of Jyväskylä JYFLTRAP experiment, a high precision mass measurement penning trap for atomic and nuclear science. Combined, these measurements will help to resolve the discrepancy of the two independent measurements.

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