

High precision half-life measurement of ^{38}Ca

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Progress on the half-life measurement of ^{38}Ca has been previously reported [1,2]. From approximately 19 million β events recorded under various detecting conditions (*i.e.*, different settings for dominant dead time, bias voltage of gas counter, and threshold of discriminator), the measured half-life is 0.4434(4) s, which is consistent with, but much more precise than, the average of all the previous measurements, 0.4400(78) s.

To further improve the precision of the measurement, we performed another ^{38}Ca half-life experiment with the same $^1\text{H}(^{39}\text{K}, 2n)$ reaction at a primary beam energy of 30A MeV. Our experimental arrangement was the same as described before [1, 2]. The overall statistics were substantially improved, but throughout the entire run the level of ^{35}Ar ($t_{1/2} = 1.77$ s) impurity was observed to vary up to $\sim 3\%$ in the reaction products. Since we were depositing ^{38}Ca mid-way through the tape, some ^{35}Ar was simultaneously deposited near the back of the tape. We considered this contribution to the decay of ^{38}Ca and its daughter ^{38}K in extracting the half-life of ^{38}Ca . Although our preliminary result, $t_{1/2}(^{38}\text{Ca}) = 0.4431(2)$ s, agrees with our previous measurement, we are planning to conduct the final half-life measurement of ^{38}Ca in the fall of 2009, during which we will reduce the ^{35}Ar contamination by depositing ^{38}Ca near the back of the tape, thus ensuring that the ^{35}Ar passes entirely through.

- [1] H. I. Park *et al.*, *Progress in Research*, Cyclotron Institute, Texas A&M University (2006- 2007), p. I-58.
- [2] H. I. Park *et al.*, *Progress in Research*, Cyclotron Institute, Texas A&M University (2007- 2008), p. I-30.