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Non destructive lifetime measurement of isomeric states in heavy ion storage rings

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Storage rings provide a unique experimental environment for non-destructive measurements of the mass and lifetime of unstable nuclei and/or their isomeric states. With their high resolution, cavity based Schottky detectors provide the speed and sensitivity required for such measurements. In order to increase the measurement accuracy, the velocity spread of the particles has to be dealt with. In the past, the electron cooler was used for this purpose. However, since the cooling time is in the order of seconds, efforts have been made to perform mass and lifetime measurements of shorter lived states by tuning the lattice of the storage ring to the isochronous ion-optical mode. In this work, we describe the successful application of this combined method of Isochronous Schottky Mass (and lifetime) Spectroscopy (ISMS) for the recent measurement of the 2 photon decay of 72m-Ge. The experimental setup, used detectors and applied methods are described and future perspectives are discussed.

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