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Doppler shift lifetime measurements using the TIGRESS Integrated Plunger at ISAC-II/TRIUMF

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Electromagnetic transition rate measurements provide fundamental probes of the structure of nuclei and stringent tests for theoretical models important to our understanding of these many-bodied ensembles. Re-accelerated beams delivered by the ISAC-II facility at TRIUMF, Canada's National Laboratory for Particle and Nuclear Physics, permit access to nuclear structure information for a wide range of radionuclides via in-beam gamma-ray spectroscopy with TIGRESS, a high-efficiency and Compton-suppressed segmented germanium clover array. Precise Doppler-shift lifetime measurements play an important role in this pursuit. Accordingly, the development of the TIGRESS Integrated Plunger (TIP) at Simon Fraser University presents the opportunity for Doppler-shift lifetime measurements of short-lived excited states using TIGRESS in combination with a plunger and an extensive suite of auxiliary charged-particle detector systems for exit channel selection following a variety of reaction mechanisms. Construction, characteristics, and implementation of the TIP plunger and its ancillary detectors will be discussed as they enable a rich set of electromagnetic transition rate measurements via Doppler-shift lifetime techniques following fusion-evaporation as well as unsafe Coulomb excitation. Recent results obtained with radioactive and stable beams will be presented.

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