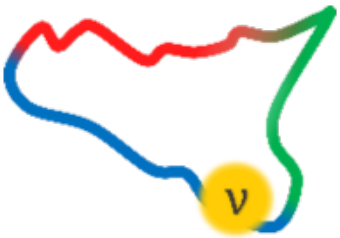

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CRAB: high-precision calibration for neutrino and dark matter experiments

Over the last few decades, major developments in cryogenic detectors have enabled detection thresholds in the energy range of a few tens of eV and resolutions in the energy range of a few eV, opening up unprecedented prospects in the search for rare events, such as the direct detection of dark matter and coherent elastic neutrino scattering on nuclei. The signal expected from these experiments takes the form of very low-energy nuclear recoil (from hundred eV to a few keV). Several calibration techniques are used to characterize cryo-detectors, but none offers a calibration that mimics the expected signal (a nuclear recoil) in the right energy range. The idea behind CRAB, which stands for Calibrated Recoil for Accurate Bolometry, is to offer an absolute calibration by inducing thermal neutron captures on the detector nuclei. A compound nucleus is then formed, with a known excitation energy - the neutron separation energy Sn - of between 5 and 8 MeV, depending on the isotope. If it deexcites by emitting a single gamma photon, the nucleus recoils with an energy of the order of 100eV, which is also perfectly known. As the detector has a cm-scale size, gamma escape without depositing any energy, and the measured energy in the cryo-detector is then due to nuclear recoils, creating calibration features.

My arrival in the collaboration coincides with the start of phase 2 of CRAB, the high-precision phase (high statistics + low background). For this purpose, the cryostat containing the cryo-detector has been moved to Vienna in Austria to the TRIGA Mk II research reactor (250 kW) to operate a pure thermal neutron beam (25 meV). A crown of BaF2 gamma detectors was installed around the cryostat to detect the gamma in coincidence with the nuclear recoil, to significantly increasing the signal-to-noise ratio.

This poster will present the new setup of CRAB phase 2. We will discuss the first commissioning data leading to the first observation of gamma/nuclear recoil coincidences, the update of 187W nuclear decay scheme, and to an overall good understanding of the setup.

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