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Highly deformed bands in europium isotopes and identification of new isotopes

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In this letter of intent, we set out a case to search for excited states in the isotopes, ^{135}Eu, ^{136}Eu, ^{137}Eu, ^{138}Eu and ^{139}Eu. Information on excited states for most of these nuclides is relatively sparse, presenting a fertile ground for discovery in a region exhibiting isomerism, shape coexistence, and superdeformation. This experiment aims to elucidate and characterise excited states built upon low-lying Nilsson bandheads, with a particular focus on the evolution of their relative excitation energy as a function of neutron number.

We request 12 days of beam time plus 1 day of setup and calibration to carry out a search for the excited states of the nuclides $^{135-139}$Eu, using the AGATA array coupled to the 4π EUCLIDES charged particle spectrometer for efficient veto of non-alpha evaporation channels and the PRISMA magnetic spectrometer for unambiguous identification of the recoils.

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