

Coulomb and quantum bubbles in heavy nuclei

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This is a letter of intent to study the proton shell structure near $Z = 82$ in the forthcoming Miniball campaign at the RIBF. The depletion of the central proton density, which characterizes the so-called bubble structure, is expected to arise from two different mechanisms. One is for a given atomic nucleus to minimize its Coulomb energy and the other to optimize the nuclear shell energy. While the shell evolution generates the bubble structure, for instance, in neutron-rich ^{34}Si , the repulsive Coulomb potential is increasingly important to form bubbles in heavier nuclei. The two mechanisms are predicted to cross over in the region near $Z = 82$. The proton structure will be studied via in-beam gamma-ray spectroscopy.

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