Contribution ID: **45** Type: **Submitted**

Hyperfine structure studies of At isotopes using in-source laser spectroscopy at ISOLDE

Tuesday 16 December 2014 13:40 (15 minutes)

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The competition between spherical and deformed configurations at low energy gives rise to shape coexistence in the neutron-deficient isotopes around the Z=82 shell closure [1], while on the neutron-rich side effects due to octupole deformation could be important. In order to determine the extent to which the ground and isomeric states of these nuclides are affected by these phenomena, an extended campaign of investigation of changes in the mean-square charge radii is being conducted at ISOLDE by the Windmill Collaboration. The measurements rely on the high sensitivity provided by a combination of the in-source laser spectroscopy with RILIS, ISOLDE mass separation and Windmill spectroscopy setup [2].

During the September 2014 IS534-III experiment, a collaborative effort was made by the RILIS [3], ISOLTRAP [4] and Windmill teams to investigate HFS/IS in a long chain of isotopes ranging from 194At to 219At (Z=85, N=109-134) [5]. These isotopes span from the region of expected deformation near the neutron mid-shell at N=104, across the spherical region at N=126, before reaching an area of predicted octupole deformation at N=132. In this contribution, we will present the systematics of the charge radii obtained from this isotopic chain.

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[3] B.A. Marsh et al., Nucl. Instr. and Meth. B 317, 550-556 (2013)

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[5] A.N. Andreyev, A. E. Barzakh, V. N. Fedosseev, P. Van Duppen et al., IS534-III experiment at ISOLDE (Sep 2014)

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Session Classification: Ground States and Decays