Abstract Submitted
for the DNP11 Meeting of
The American Physical Society

Spectroscopy of the hadronic atoms and superheavy isotopes: Energy shifts and strong K, pi- N interaction corrections OLGA KHETSELIUS, INGA SERGA, ANASTASIYA SHAKHMAN, Odessa University — Ab initio many-body perturbation theory approach with an accurate account of relativistic, nuclear, radiative effects is used in calculating spectra of some hadronic (pion, kaon) atoms. One of the main purposes is establishment a quantitative link between quality of nucleus structure modeling and accuracy of calculating energy and spectral properties. The wave functions zeroth basis is found from the Klein-Gordon-Fock equation for hadronic system and the Dirac-Fock equation for usual atom. The potential includes the SCF ab initio potential, the electric and polarization potentials of a nucleus (the RMF and Fermi models for a charge distribution in a nucleus are considered). For low orbits there are the important effects due to the strong hadron-nuclear interaction. We present the data on: the energy levels for superheavy isotopes Z=113,114 and the shifts and widths of transitions (2p-1s,3d-2p, 4f-3d etc) in some pionic and kaonic atoms (H, He, N, W, U). The calculated X-ray transitions spectrum for kaonic He and estimate of 2p level shift due to the strong K-N interaction 1.57 eV are in the reasonable agreement with experiment (the shift 1.9eV) by Okada et al (2008; E570; KEK 12GeV, RIKEN Nishina Centre, JAPAN) and differ (about order) of other experimental data by Wiegand-Pehl (1971), Batty et al (1979), Baird et al (1983).

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Date submitted: 12 Jul 2011 Electronic form version 1.4