

Helium atoms and molecules in strong magnetic fields

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Recent theoretical studies have shown that the neutron star surface may be composed of helium or heavier elements as hydrogen may be quickly depleted by diffuse nuclear burning (Chang & Bildsten). However, while Hydrogen atmospheres have been studied in great details, atomic data for helium is available only for He^+ ion (Pavlov Bezchastnov 2005). We performed Hartree-Fock type calculation for Helium atom and molecules and computed their binding, ionization and dissociation energies in strong magnetic fields ($B \sim 10^{12}$ – 10^{15} G). We will present ionization balance of Helium atmospheres at typical magnetic field strengths and temperatures to radio-quiet neutron stars and AXPs. We will also discuss several implications of helium atmosphere to X-ray data of isolated neutron stars focusing on the detected spectral features.