

Rydberg Atom Formation in Cold (Anti)plasmas

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In 2002 the ATHENA and ATRAP collaborations have reported the first production of cold antihydrogen atoms at CERN. Subsequently several properties of these exotic atoms and characteristics of their formation dynamics could be probed – both being crucial for the success of future cooling and trapping of the created atoms.

In this talk, I will present results of extensive Monte-Carlo calculations describing the formation of highly excited antihydrogen atoms in strong magnetic fields. It will be demonstrated that the internal and translational state distribution observed in ATRAP's experiments can be consistently explained if all relevant collision processes are properly taken into account.

Based on these results, I will identify general properties of collisionally formed Rydberg atoms and present semi-classical calculations of their long-time dynamics in the inhomogeneous fields of strong atom-traps. Implications for prospects of future trapping experiments will be discussed.