

Plenary Talk

PV XI Fri 9:00 e415

Physics beyond the Standard Model from hydrogen molecules

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The hydrogen molecule is the smallest neutral chemical entity and a benchmark system of molecular spectroscopy. The comparison between highly accurate measurements of transition frequencies and level energies with quantum calculations including all known phenomena (relativistic, vacuum polarization and self-energy) provides a tool to

search for physical phenomena in the realm of the unknown: are there forces beyond the three included in the Standard Model of physics plus gravity, are there extra dimensions beyond the 3+1 describing space time ? Comparison of laboratory wavelengths of transitions in hydrogen may be compared with the lines observed during the epoch of the early Universe to verify whether fundamental constants of Nature have varied over cosmological time. Details of the precision laboratory experiments on molecular hydrogen, its stable and radioactive isotopic species, as well as the HD⁺ molecular ion, will be presented.