dynamics du to changes of interatomic potential by external fields in the vicinity of Foster resonance. Foster resonance corresponds to the double photon resonance, i.e. a Rydberg l-state should be situated exactly in the middle between two neighbor l'=l+1-states (or l-1-states). Quantitatively, this situation occurs when the difference between quantum defects of the states equal to 1/2 and is known as Seaton criterion for suppressed the corresponding dipole matrix elements. The latter can be realized in astrophysical samples (plasma, or dust, for instance) containing alkalis neutral atoms due to the Stark or Zeeman shifts of levels under the presence of electrical/magnetic fields. Experimentally, it is manifests itself as an anomalous weak fluorescence of the radiation escaping from a star/planet atmosphere or as a reduced ionization channel output in chemiionization reactions.

Invited lecture

ACCURATE COLLISIONAL BROADENING PROFILES FOR ALKALI RESONANCE LINES IN SUBSTELLAR ATMOSPHERE MODELS

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The optical and far red (up to 1 μm) spectral energy distribution of the coolest substellar atmospheres is shaped by prominent absorption features due to the alkali resonance lines of Na I and K I. Broadening by collisions with neutral perturbers, predominantly molecular hydrogen and helium, can extend the far wings of these lines out to several 1000 Å. In the dense and mostly dust-free and clear atmospheres of T dwarfs these lines, together with the weaker features of the less abundant alkalis Li, Rb and Cs, probe the photosphere over many pressure scale heights. The resulting spectral profile is a product not only of interactions with perturbers at far and near distances, but as well of thermal structure and the distribution of neutral alkali gases as a function of height. It allows thus to test models for convection-driven energy transport and vertical mixing extending into the overshoot region, and for the efficiency of condensation. Observations of such lines in brown dwarf spectra provide an important test case for the understanding of these same processes in extrasolar gas giant planets, including the more complex case of irradiation in hot Jupiters.