Quantum dynamical calculations on the surface catalysed formation of H_2 in interstellar space.

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H_2 is one of the most important molecules in the interstellar medium. It plays a pivotal role in interstellar chemistry through reactions with ions and radicals. Furthermore, the energetics of the H_2 formation reaction directly affect the thermal balance of the interstellar medium. It is widely accepted that the dominant mechanism for the formation of H_2 in interstellar clouds is through surface-catalysed reactions on dust-grains.[1]

$$\mathrm{H(g) + H(ads)/dust \longrightarrow H_2(v, j) + dust} \tag{1}$$

In this talk I will present quantum dynamical calculations using time-dependent wave packets, performed on reaction (1), whereby we have represented the interstellar dust-grain by a graphite surface. I will also discuss similarities and differences with the formation of the isotopic analogues HD and D_2. These calculations will be compared to recent experimental and observational studies performed in the Centre for Cosmic Chemistry and Physics at University College London (UK).

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[1] H. C. van der Hulst, Rec. Astron. Obs. **XI(II)** (1949).