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Growth of polycyclic aromatic hydrocarbons by ion-molecule reactions DANIELA ASCENZI, JULIA AYSINA, PAOLO TOSI, Department of Physics University of Trento, ANDREA MARANZANA, GLAUCO TONACHINI, Department of Chemistry University of Torino — In this contribution we discuss a few molecular mechanisms leading to the growth of polycyclic aromatic hydrocarbons (PAHs). Such compounds have been observed in quite different gaseous environments (e.g. combustion systems, interstellar medium, hydrocarbon plasmas), thus understanding the formation of such ubiquitous molecules has become an increasingly important research topic. While great progress has been made in the knowledge of synthesis routes based on radical and neutral reactions, much less is known about ionic mechanisms leading to the synthesis of PAHs. By using a guided ion beam tandem mass spectrometer, we have explored the reactivity of $C_{10}H_7^+$ with C_6H_6, observing the growth of hydrocarbon ions via C-C bond forming reactions. The condensation adduct $C_{16}H_{13}^+$ is observed as the most abundant product at the smallest collision energy ($\sim$ 0.2 eV). Other products are the ions $C_{16}H_n^+$ (n=10-12) coming from H and H_2 elimination from the adduct, and the $C_{15}H_{10}^+$ ion formally corresponding to a CH_3 elimination. To elucidate the mechanisms responsible for such a rich chemistry we have performed *ab initio* calculations.

Paolo Tosi
Department of Physics University of Trento

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