

An ion-atom hybrid trap on a chip: synthesis and control of nanosystems on the single-molecule level

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Abstract

The project concerns the development of a hybrid trap on a semiconductor chip for the simultaneous trapping of single atomic and molecular ions with ultracold atoms. The project will advance current trapping technology to enable for the first time a complete quantum manipulation of a combined ion-atom system paving the way for the engineering of new nanoscopic quantum systems and the full quantum control of chemical reactions on the single-molecule level. The project is highly interdisciplinary, combining the nanosciences, chemistry and quantum optics, and is laid out as a collaboration between the Willitsch (Dept. of Chemistry) and the Treutlein (Dept. of Physics) groups.