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Foreword

Paradigm for the reactive collisions, the dissociative recombination of electrons with molecular cations is a major process in the ionized cold and diluted media, often far from equilibrium: interstellar molecular clouds, planetary atmospheres, plasmas formed at the hypersonic entry of space-crafts, plasmas close to the wall of the fusion devices (e.g. ITER project) and combustion gases – either "standard", or assisted by electric fields or plasmas. Several other processes compete with DR, such as rovibrational excitation, dissociative excitation and ion-pair production. Its inverse reaction, the associative ionization ("chemi-ionization") is a very important process in the production of charged particles in various gaseous media.

All these reactive collisions, driven by the coupling between the electronic and the internuclear motions, are strongly resonant, due to the interference between numerous ionization and dissociation channels. The related experimental methods include the single-pass merged- and crossed- beam devices, the heavy ion storage rings, the ion traps, the stationary or flowing plasma techniques and the laser diagnostics of molecular excitations.

The research on these processes overlaps strongly with those from other fields of molecular physics, like photofragmentation via superexcited states, resonant electronic attachment and negative ions, and electron-induced processes in large molecules and clusters. It is also of great interest for feeding database for astrophysics and plasma physics.

The ninth meeting of the series has been organized jointly by Pr. Ioan F. Schneider (Laboratoire Ondes et Milieux Complexes (LOMC), Le Havre University and CNRS), and Dr. Olivier Dulieu and Pr. Jacques Robert (Laboratoire Aimé Cotton (LAC), CNRS, Paris-Sud University, and ENS Cachan). It took place at FIAP Jean Monnet Convention Centre, Paris, from 7 to 12 July 2013.

The previous editions of this series of conferences have been organized in Lake Louise, Canada (1988), Saint-Jacut de la Mer, France (1992), Ein Gedi, Israel (1995), Nässlingen, Sweden (1999), Chicago, USA (2001), Mosbach, Germany (2004), Ameland, The Netherlands (2007) and Lake Tahoe, USA (2010). They have generated a series of carefully edited and refereed Proceedings volumes (DR2010, DR2007 and DR2004) that serve as accepted, in-depth references in the research field.

The present issue of European Physical Journal "Web of Conferences" contains 28 papers elaborated from presented talks, for the first time in freely accessible online version. The articles are organized in 7 general areas, which offer a representative sample of the conference topics:

01- Experimental studies of dissociative recombination
02- Theoretical studies of dissociative recombination
03- Quantum chemistry of superexcited molecular states
04- Molecular superexcited states and fragmentation

05- Internal excitation and interactions of molecular ions
06- Data needs on dissociative recombination and related processes
07- Negative Ions

We are convinced that the present articles gather the essential of the series of "DR" conferences, with both experimental and theoretical contributions, either at the heart of the physics of dissociative recombination and of related processes, or opened toward interdisciplinary investigations.

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Scientific editors of the DR2013 proceedings