



Contribution ID: 193

Type: **Invited Speaker**

## Buffer gas cooling of trapped ions using ultracold atoms

*Tuesday, 26 September 2023 11:15 (30 minutes)*

I will discuss the ups and downs of buffer gas cooling of trapped ions in the ultracold regime [1-3]. I will focus on attainable temperatures, collision energies and possible issues such as spin exchange and relaxation during atom-ion collisions [4] as well as trap-assisted complexes that can arise after an atom-ion collision [5]. I will discuss the prospects of using the system to explore polaronic physics in an ultracold gas. Furthermore, I will present some results in quantum chemistry that we obtained some time ago when we immersed an ion into a cloud containing Li<sub>2</sub> dimers [6,7]. These results are of interest when considering charged impurity physics in the BEC to BCS crossover regime in a fermionic spin mixture. Moreover, they highlight the possibilities offered to study quantum chemistry in the system.

- [1] H. Hirzler et al., Phys. Rev. A 102, 033109 (2020).
- [2] E. Trimby et al., New Journal of Physics 24, 035004 (2022).
- [3] T. Feldker et al., Nature Physics 16, 413–416 (2020).
- [4] H. Furst et al., Phys. Rev. A 98, 012713 (2018).
- [5] H. Hirlzer et al., Phys. Rev. Lett. 130, 143003 (2023).
- [6] H. Hirzler et al., Phys. Rev. Research 2, 033232 (2020).
- [7] H. Hirlzer et al., Phys. Rev. Lett. 128, 103401 (2022).

**Primary author:** GERRITSMA, Rene (University of Amsterdam)

**Presenter:** GERRITSMA, Rene (University of Amsterdam)

**Session Classification:** Tuesday