

Towards a Magneto-Optical Trap of Aluminium Monofluoride Molecules

Wei Wei Liu,^{1,*} Lajos Palanki,¹ Dylan Brown,¹
Carlos Alarcon Robledo,¹ and Stefan Truppe¹

¹*Centre for Cold Matter,
Blackett Laboratory, Imperial College London, UK*

Laser cooling and trapping of molecules offers powerful opportunities in precision measurement, quantum simulation, and quantum information processing. Thus far, most molecules trapped in a magneto-optical trap (MOT) are chemically reactive and support only simple laser cooling schemes from the first excited rotational level. Aluminium monofluoride (AlF), by contrast, is deeply bound and chemically stable, with a highly diagonal Franck–Condon factor enabling efficient optical cycling, and the $A^1\Pi \rightarrow X^1\Sigma^+$ cooling transition near 227.5 nm featuring rotationally closed Q(J) lines. I will present our progress towards an AlF MOT, including the development of high-power deep ultraviolet laser systems, slowing and capture of AlF, and simulations of sub-Doppler cooling and dipole trapping.

* wei.liu24@imperial.ac.uk; <https://www.imperial.ac.uk/centre-for-cold-matter/>