Cryogenic ion trap to study cold and controlled ion-radical reactions

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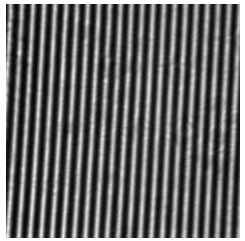
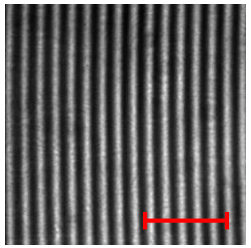
New optical system

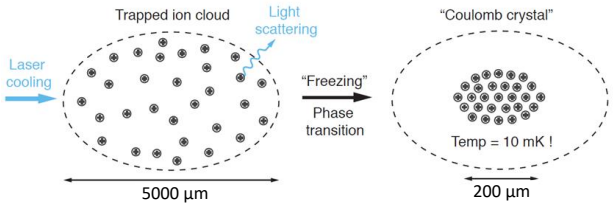
Image of a Ronchi ruling with 100 lines per mm



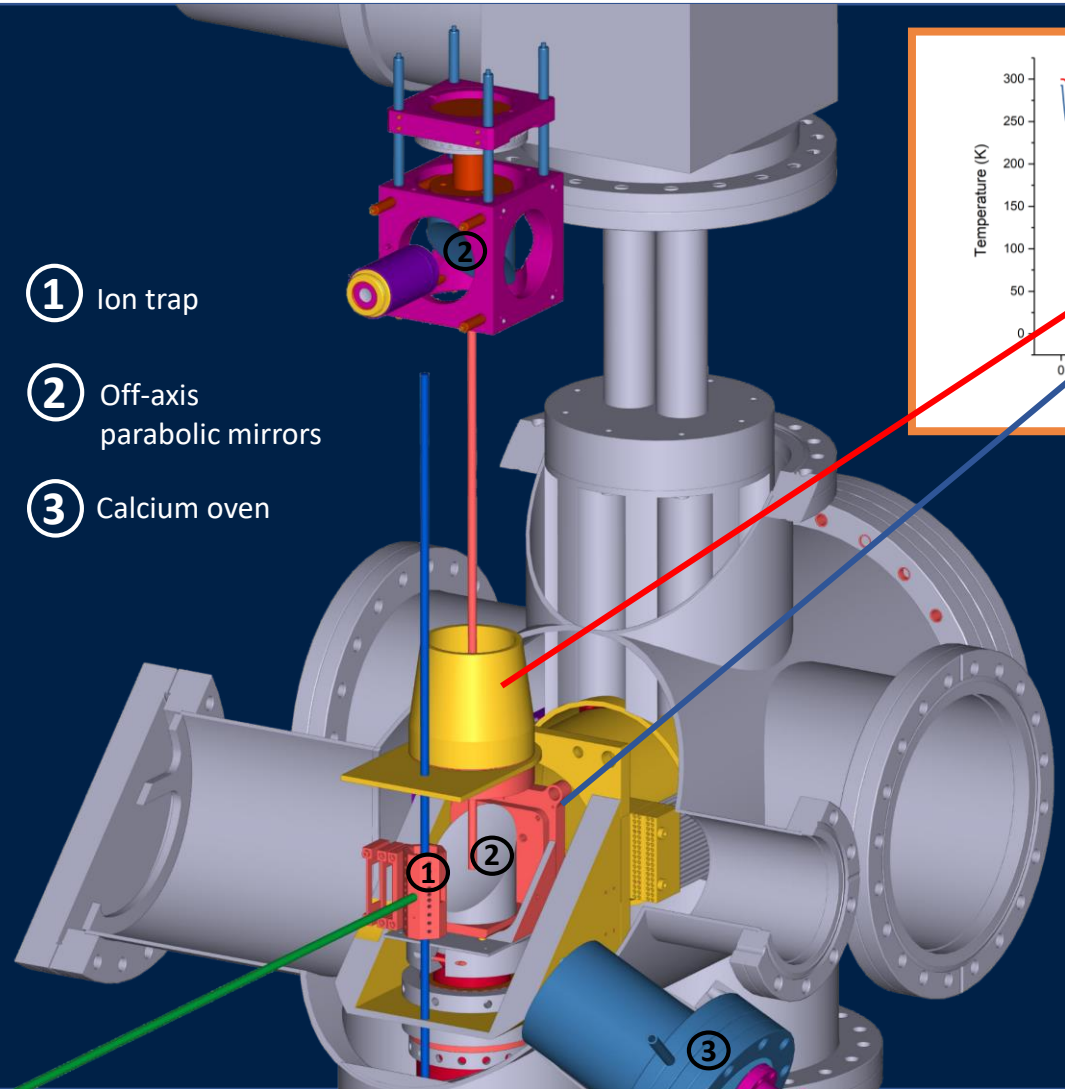


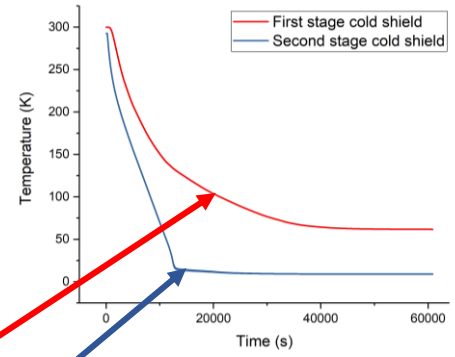
With the Ronchi ruling and the first off-axis parabolic mirror situated **outside of the chamber, at room temperature**

With the Ronchi ruling and the first off-axis parabolic mirror situated **inside the chamber, at cryogenic temperatures**



Distance between neighbouring ions in a Coulomb crystal is ~10–20 µm





Cryogenic system

- First stage cold shield: **60 K**
- Second stage cold shield and ion trap: **9 K**

Next steps

- Generating calcium Coulomb crystals
- Once Ca^+ Coulomb crystals have been formed: attach the Zeeman decelerator and magnetic guide
- First ion-radical target reaction : $N_2^+ + H\cdot$

References

[1] J. Toscano, M. Hedjuk, H. McGhee, B. Heazlewood Review of Scientific Instruments, 90, 033201 (2019).
[2] M. Hedjuk, B. Heazlewood, Review of Scientific Instruments, 90, 123701 (2019).