




Monday, 23 October 2023

Lecture Hall N24/H13, at 16:15
Coffee and cookies will be served in front of the lecture hall from 16:00

Diffraction of polyatomic molecules: challenges and solutions

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 https://www.dlr.de/qt/desktopdefault.aspx/tabid-18247/29014_read-76373/



More than 20 years ago, the wave-particle duality of complex, polyatomic molecules was first demonstrated [1]. Since then, the experiments are continuously refined to test in which mass range quantum mechanics still prevails [2, 3]. In parallel, molecule interferometry matured into a highly sensitive technique to determine internal molecular properties [4].

This colloquium will introduce the principle of matter-wave diffraction. After briefly discussing the basic components, we will focus on gratings for complex matter waves. We will review possible ways to interact with internally hot, complex molecules and highlight recent advances in this field. These include Bragg diffraction [5], atomically-thin beamsplitters [6], and new approaches to sort molecules [7].

References

- [1] Arndt et al., *Nature* **401**, 680-682 (1999)
- [2] Arndt und Hornberger, *Nat. Phys.* **10**, 271-277 (2014)
- [3] Fein et al., *Nat. Phys.* **15**, 1242-1245 (2019)
- [4] Berninger et al., *Phys. Rev. A* **76**, 013607 (2007)
- [5] Brand et al., *Phys. Rev. Lett.* **125**, 033604 (2020)
- [6] Brand et al., *Nat. Nanotechnol.* **10**, 845-848 (2015)
- [7] Brand et al., *Phys. Rev. Lett.* **121**, 173002 (2018)