Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Matter wave interferometry as a tool for molecule metrology STEFAN GERLICH, MICHAEL GRING, HENDRIK ULBRICHT, University of Vienna, KLAUS HORNBERGER, Ludwig-Maximilians-University Munich, JENS TUEXEN, MARCEL MAYOR, University of Basel, MARKUS ARNDT, University of Vienna — Kapitza-Dirac-Talbot-Lau interferometry (KDTLI) has recently been established as an ideal method to perform quantum matter wave experiments with large, highly polarizable molecules in an unprecedented mass range of beyond 1000 atomic mass units [1]. Since the interference visibility reveals important information on the properties of the examined particles, such as their mass and polarizability, we identified KDTLI as a valuable tool for precision metrology. We demonstrate that quantum interferometry can therefore also serve as a powerful complement to mass spectrometry [2], in particular in cases where fragmentation may occur in the detector. Our new method is applicable to a wide range of molecules and is particularly valuable for characterizing neutral molecular beams.
[1] S. Gerlich, L. Hackermüller, K. Hornberger, A. Stibor, H. Ulbricht, M. Gring, F. Goldfarb, T. Savas, M. Müri, M. Mayor, M. Arndt, Nat. Phys. 2007, 3, 711 715.
[2] Stefan Gerlich, Michael Gring, Hendrik Ulbricht, Klaus Hornberger, Jens Tüxen, Marcel Mayor, and Markus Arndt, Angew. Chem. Int. Ed. 2008, 47, 6195 - 6198.

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Date submitted: 21 Nov 2008 Electronic form version 1.4