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Probing ultracold Bose-Fermi mixtures in optical lattices JANNES HEINZE, SÖREN GÖTZE, JASPER SIMON KRAUSER, BASTIAN HUNDT, NICK FLÄSCHNER, DIRK-SÖREN LÜHMANN, CHRISTOPH BECKER, KLAUS SENGSTOCK, University of Hamburg, Institute for Laser-Physics — Quantum gases in optical lattices offer a wide range of applications for quantum simulation due to fully tunable lattice and atomic interaction parameters. In particular the use of particles with different statistics provides novel possibilities compared to conventional solid state systems. In this poster we report on high resolution spectroscopy of both ultracold bosons and fermions in optical lattices. The band structure is extracted fully momentum resolved [1] and interacting and non-interacting systems are compared. In addition, we are able to identify different excitations, such as the recently proposed amplitude mode in strongly correlated bosonic systems by comparing the data with numerical calculations [2]. This includes systematic shifts of the resonances, e.g. due to beyond linear response effects and the underlying harmonic confinement. [1] P. T. Ernst et al., Probing superfluids in optical lattices by momentum-resolved Bragg spectroscopy, Nature Physics 6, 56 - 61 (2010) (DOI: 10.1038/nphys1476); [2] U. Bissbort et al., Detecting the Amplitude Mode of Strongly Interacting Lattice Bosons by Bragg Scattering, arXiv:1010.2205

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