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**Direct Measurement of the Zak phase in Topological Bloch Bands** MARCOS ATALA, MONIKA AIDELSBURGER, Fakultät für Physik, Ludwig-Maximilians-Universität, Schellingstr. 4, 80799 Munich, Germany, JULIO T. BAR-REIRO, Max Planck Institute of Quantum Optics, Hans-Kopfermann Str. 1, 85748 Garching, Germany, DMITRY ABANIN, TAKUYA KITAGAWA, EUGENE DEM-LER, Department of Physics, Harvard University, 17 Oxford Str., Cambridge, MA 02138, USA, IMMANUEL BLOCH, Max Planck Institute of Quantum Optics, Hans-Kopfermann Str. 1, 85748 Garching, Germany — In this talk I will present our latest results on the direct measurement of the Zak phase for a dimerized optical lattice, which models polyacetylene. The experimental protocol consists of a combination of Bloch oscillations and Ramsey interferometry from where we extract the Zak phase - the Berry phase acquired during an adiabatic motion of a particle across the Brillouin zone - which can be viewed as an invariant characterizing the topological properties of the band. This work establishes a new general approach for probing the topological structure of Bloch bands in optical lattices.

> Marcos Atala Fakultät für Physik, Ludwig- Maximilians-Universität, Schellingstr. 4, 80799 Munich, Germany

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