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Imaging the Mott insulator shells using atomic clock shifts GRETCHEN K. CAMPBELL, JONGCHUL MUN, MICAH BOYD, PATRICK MEDLEY, MIT-Harvard Center for Ultracold Atoms, Research Laboratory of Electronics, MIT, LUIS MARCASSA, Instituto de Fisica de Sao Carlos - University of São Paulo-Brazil, DAVID E. PRITCHARD, WOLFGANG KETTERLE, MIT-Harvard Center for Ultracold Atoms, Research Laboratory of Electronics, MIT — We have used 2-photon microwave spectroscopy to probe the Superfluid- Mott Insulator transition in a 3D optical lattice. Using the mean field clock shift we were able to distinguish between sites with different filling factor due to their higher interaction energy. This also allowed us to directly image the shell structure of the Mott Insulator. In addition we could measure the on-site interaction and lifetime for individual shells. Filling factors of up to n=5 have been observed.

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