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Force Microscopy with Light Atom Probes FRANZ GIESSIBL, STEFAN HEMBACHER, JOCHEN MANNHART, Institute of Physics, Augsburg University, Germany — The charge distribution in atoms with closed electron shells is spherically symmetric, while atoms with partially filled shells can form covalent bonds with pointed lobes of increased charge density. Covalent bonding in the bulk can also affect surface atoms, leading to four tiny humps spaced by less than 100 pm in the charge density of adatoms on a (001) tungsten surface. We image these charge distributions via atomic force microscopy by using a light-atom probe (a graphite atom) to directly measure high-order force derivatives of its interaction with a tungsten tip. Features with a lateral distance of only 77 pm are revealed (Science 305, 380, 2004).

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