Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Distortion of scanning-tunnelling-spectroscopy images of isolated molecules induced by electron correlation MASSIMO RONTANI, DIMITRIOS TOROZ, STEFANO CORNI, CNR-NANO S3, Modena, Italy — Scanning tunnelling spectroscopy (STS) visualizes electron states in both extended systems and nano-objects, as quantum dots and molecules. Whereas bulk quantum states are insensitive to electron number fluctuations, an energy gap opens each time a new electron is injected by the STS tip into a sufficiently small system. This gap originates from the interaction of the next incoming electron with the others already present in the system. In this Coulomb blockade regime a fundamental question is whether the wave function of the "quasi-particle" added to the system -imaged by the STS tip- is sensitive to electron-electron interaction. Here we show that the STS images of single planar molecules with metal centres predicted by ab initio many-body calculations differ qualitatively from their uncorrelated counterparts. We find in the maps resolved at the Fermi energy that correlation significantly removes spectral weight from the metal atom, as well as the overall weight is remarkably reduced. This change may be measured and compared with STS images of molecules without the metal center, whose many-body and uncorrelated versions are alike.

Massimo Rontani
CNR-NANO S3, Modena, Italy

Date submitted: 30 Nov 2010 Electronic form version 1.4