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Stark shift of transmission resonance in scanning tunneling spectroscopy WEI-BIN SU, SHIN-MING LU, CHI-LUN JIANG, HWA-TE SHIH, CHIA-SENG CHANG, TIEN-TZOU TSONG, Institute of Physics, Academia Sinica, 115 Nankang, Taipei, Taiwan — It is known that the free electron scattered by the quantum well in the metal film may manifest the transmission resonance and it can be probed by scanning tunneling spectroscopy (STS). We use STS to observe the transmission resonance on Ag films grown on the Si(111)7x7 surface. In addition to reveal the signal of the transmission resonance in the tunneling spectrum, there also appears that its energy level can be shifted by tuning the tunneling current, i.e. the electric field in the tunneling gap. Our results demonstrate that the transmission resonance is shifted to higher energies with increasing electric field, but beyond a critical field, it will drop to a lower energy discontinuously. This field-dependent behavior can be qualitatively explained by a field-induced phase variation in the quantization rule.

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