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**Coherent coupling between a Josephson phase qubit and an LC resonant cavity** MIKA SILLANPAA, JAE PARK, RAYMONDS SIMMONDS, National Institute of Standards and Technology — We have taken the first step towards the implementation of cavity QED quantum information processing with Josephson phase qubits. We have observed for the first time a coherent interaction between a phase qubit and an LC cavity formed by a 7 mm long coplanar waveguide resonant at 9 GHz. At the co-resonant point of the qubit and cavity, we observe splitting of the qubit's spectral line. In a time-domain measurement, we observe coherent vacuum Rabi oscillations between the qubit and oscillator.

Mika Sillanpaa  
National Institute of Standards and Technology

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