Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Ferromagnetic Josephson junctions with niobium nitride[1]
TARO YAMASHITA, KAZUMASA MAKISE, AKIRA KAWAKAMI, HIROTAKA TERAI, NICT - Kobe — Recently, novel physics and device applications in hybrid structures of superconductor (SC) and ferromagnet (FM), e.g., spin injection into SC, long-range Josephson effect, cryogenic memory, have been studied actively. Among various interesting phenomena in SC/FM structures, a π state (π junction) emerged in ferromagnetic Josephson junctions (SC/FM/SC) is attractive as a superconducting phase shifter for superconducting devices. In the present work, we developed the ferromagnetic Josephson junction in order to realize a quiet superconducting flux qubit with a π junction. Contrary to conventional flux qubits, the qubit with a π junction can be operated without an external magnetic field which is a noise source, and thus good coherence characteristics is expected. As a superconducting material, we adopted niobium nitride (NbN) with high superconducting critical temperature of ˜16 K, which can be grown epitaxially on a magnesium oxide substrate. Regarding the ferromagnetic material we used copper nickel (CuNi), and fabricated the NbN/CuNi/NbN junctions and then evaluated the dependences of the Josephson critical current on the temperature, thickness and so on.

[1]This research was supported by JST, PRESTO.

Taro Yamashita
NICT - Kobe

Date submitted: 10 Nov 2016 Electronic form version 1.4