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**Atom Quantum Interference Device.** MICHELE SABA, GYU-BOONG JO, TOM PASQUINI, YONG-IL SHIN, CALEB CHRISTIANSEN, SEBASTIAN WILL, WOLFGANG KETTERLE, DAVID PRITCHARD, MIT, KETTERLE/PRITCHARD GROUP, CENTER FOR ULTRACOLD ATOMS, MIT TEAM — We experimentally realize a weak link between two Bose-Einstein condensates with a stream of atoms moving with two photon recoils [1]. The flux of atoms is proven to depend on the relative phase between the two condensates in the same way that the flux of Cooper pair in a Josephson junction depends on the phase between two superconducting islands. Differently from a Josephson junction though, the phase accumulated by the atoms while traveling from one condensate to the other can be controlled experimentally by fine tuning their recoil velocity. This peculiarity of the atomic system stems from the large size and accessibility of atomic junctions with respect to solid state ones. We will elaborate on the scientific offspring of the experiment, like the prospect of realizing highly non-classical distribution of atoms between two condensates, and on the technical one, like the possibility of turning the atomic junction into a ring gyroscope that detects the Sagnac phase induced by rotations. [1] Y. Shin, G.-B. Jo, M. Saba, T. A. Pasquini, W. Ketterle, and D. E. Pritchard, Optical Weak Link between Two Spatially Separate Bose-Einstein Condensates Phys. Rev. Letters 95, 170402 (2005)

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