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**Construction of a Thick-Crystal Neutron Interferometer Using New Fabrication Techniques** BENJAMIN HEACOCK, AR YOUNG, North Carolina State Univ, M ARIF, MG HUBER, ME JAMER, NIST, R HAUN, Tulane Univ, K HIROTA, M KITAGUCHI, H SHIMIZU, T YAMAMOTO, Nagoya Univ, T HOSOBATA, Y YAMAGATA, RIKEN, DA PUSHIN, I TAMINIAU, Institute for Quantum Computing — The construction of a monolithic, thick crystal, "perfect" silicon neutron interferometer using a ultra-high precision grinding technique and a combination of annealing and chemical etching that differs from the construction of prior neutron interferometers is described. Under these fabrication conditions, the interferometer exhibits an excellent interference fringe visibility of 80%. The interferometer was tested throughout the post fabrication process, and perturbations to the expected interference signal are found to correspond to subsurface damage that is alleviated through a combination of annealing and chemical etching. These fabrication techniques can be extended to other neutron interferometers or experiments using Bragg-diffracting crystals, where the crystal shape and the integrity of the Bragg planes at the crystal surface are important.

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