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NEW ABSTRACT:

The irreducible sectors of the Jones unitary Hecke algebra representations of the braid groups are shown to have dense images in the special unitary groups. This has applications in topology, e.g., 1) Let  $A$  be a subset of all links which contains all alternating links, then the evaluation of the Jones polynomial at  $r$ -th root of unity of all links in  $A$  is dense in the complex plane if  $r$  is not 1,2,3,4,6. 2) The distributions of the values of the Jones polynomials of all braid closures at the above  $r$ 's converge to a known Gaussian distribution in the large braid limit. Other consequences include the universality of certain modular functors for quantum computation. A salient feature of the unitary Hecke algebra representations of the braid groups is a two-eigenvalue property which allows us to identify the closed images of these representations. This is a joint work with M. Freedman and M. Larsen.