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Joseph A Quinn* (quinn@momath.org), Chief of Mathematics, National Museum of Mathematics, 11 East 26th Street, New York, NY 10010. *Macfarlane hyperbolic 3-manifolds.*

We identify and study a class of hyperbolic 3-manifolds whose (generalized) quaternion algebras admit a geometric interpretation analogous to Hamilton's classical model for Euclidean rotations. We call these Macfarlane manifolds, as they incorporate a modern generalization of Alexander Macfarlane's classical ideas about hyperbolic quaternions. We characterize these manifolds arithmetically, and show that infinitely many commensurability classes of them arise in diverse topological and arithmetic settings. We then use this perspective to introduce a new method for computing their Dirichlet domains. We also give similar results for a class of hyperbolic surfaces and explore their occurrence as subsurfaces of Macfarlane manifolds. (Received August 23, 2018)