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Weiqiang Wang* (ww9c@virginia.edu), Department of Mathematics, University of Virginia,
Charlottesville, VA 22904. *What is super in representation theory of Lie superalgebras?*

The notion of Lie superalgebras is obtained from Lie algebras by an innocent change of signs and is motivated largely by supersymmetry, but the sign change causes all kind of difficulties in super representation theory. We will review some of the well-known development in the 20th century for irreducible characters of semisimple Lie algebras from the Weyl character formula to Kazhdan-Lusztig theory for Bernstein-Gelfand-Gelfand category \mathcal{O} . We will explain why representations of Lie superalgebras are so dramatically different by examples, what difficulties lie in some traditional approaches to super representation theory while noting similarities to representations of semisimple Lie algebras. Then we present how some recent approach developed in the 21st century using canonical basis and category equivalence helps to solve longstanding problems and conjectures on irreducible characters in (parabolic) Bernstein-Gelfand-Gelfand categories for Lie superalgebras. The connection to symmetric functions plays a fundamental role. (Received September 24, 2011)