1147-35-587   **Lyudmila Korobenko***, korobenko@reed.edu. *Log-Sobolev inequalities, doubling condition, and degenerate elliptic PDE's.* Preliminary report.

The importance of Sobolev-type inequalities in the regularity theory of certain degenerate elliptic PDE's has been explicitly documented in Fabes, Kenig and Serapioni's 1982 paper. They identified four conditions on an absolutely continuous measure associated to the operator (among which are the (q,p)-Sobolev inequality and the doubling condition), as essential in proving Harnack's inequality for solutions. An interplay between all four conditions has been further investigated, and in particular it has been recently shown that the (q,p) with q>p actually implies the doubling condition. When the degeneracy of the operator is of infinite type, the associated measure is no longer doubling, and as a consequence the classical Sobolev inequality is also unavailable. However, weaker versions, such as log-Sobolev (or, more generally, Orlicz-Sobolev) inequalities can be used in an adaptation of the classical Moser or DeGiorgi iteration scheme to show improved regularity of weak solutions. In this talk I will discuss the connection between these weaker types of Sobolev inequalities and the doubling condition, and their connection to infinitely degenerate elliptic PDE's. (Received January 26, 2019)