Interpolated global Sobolev inequalities with general $L^p$ end points and applications to nonlinear wave and Klein-Gordon equations.

A celebrated and potent tool for studying the long-time behavior of wave and Klein-Gordon equations is the Klainerman-Sobolev inequalities relating space-time weighted $L^2$ integrals of higher derivatives of some unknown $u$ on hypersurfaces to space-time weighted $L^\infty$ control of $u$. From the derivative counting point of view, these inequalities are not scaling-sharp. For classical applications toward global stability this is however not an issue. Recently we began investigating nonlinear equations whose solution exhibit anomalous peeling, where higher derivatives of the unknown decay more poorly when compared with the standard decay rates of the linear equation. For these types of equations the lack of scaling-sharpness of the classical Klainerman-Sobolev inequalities pose an obstacle to concluding the stability analysis, as the derivative-loss now becomes coupled to also a decay-loss. In this talk we will discuss scaling-sharp analogues of the Klainerman-Sobolev inequalities, which necessarily will have endpoints in $L^p$ with $p < \infty$, and can be regarded as the Gagliardo-Nirenberg interpolated versions of global Sobolev inequalities. Applications of these inequalities to nonlinear problems will also be presented. (Received August 20, 2019)