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**Xinliang An\*** ([anxinliangsky@gmail.com](mailto:anxinliangsky@gmail.com)), Hill Center for the Mathematical Sciences, 110 Frelinghuysen Road, Piscataway, NJ 08854-8019. *On Gravitational Collapse in General Relativity.*

Abstract: In the process of gravitational collapse, singularities may form, which are either covered by trapped surfaces (black holes) or visible to faraway observers (naked singularities).

In this talk, I will present three results.

The first is a simplified approach to Christodoulou's monumental result which showed that trapped surfaces can form dynamically by the focusing of gravitational radiation from past null infinity. We extend the methods of Klainerman-Rodnianski, who gave a simplified proof of this result in a finite region.

The second result extends the theorem of Christodoulou by allowing for weaker initial data but still guaranteeing that a trapped surface forms in the causal domain. In particular, we show that a trapped surface can form dynamically from initial data which is merely large in a scale-invariant way. The second result is obtained jointly with Luk.

The third result extends Christodoulou's celebrated example on formation of naked singularity for Einstein-scalar field system under spherical symmetry. With numerical and analytic tools, we generalize Christodoulou's result and construct an example of naked singularity formation for Einstein vacuum equation in higher dimension. The third result is obtained jointly with Zhang. (Received August 29, 2015)