Fundamental fields and compact objects

a. New black hole solutions with Proca hair or self-interacting scalar hair (Herdeiro+2016)

b. New black hole solutions with self-interacting scalar hair (Herdeiro+2016)

c. Superradiance can form black holes with ultra-light bosonic hair (Sanchis-Gual+2016, Herdeiro+2017)

d. Proca stars can be stable, evolve towards black holes or migrate to more stable stars (Sanchis-Gual+2017)

e. New black hole solutions with electric charge and hair (Delgado+2017, Herdeiro+2017)

Fundamental fields: constraints and signatures

a. BHs spin down via superradiance, placing impressive constraints on field masses (Brito+ 2017, Brito+2017)

b. Pulsars spin down via superradiance.
(Cardoso, Pani Tien-tien 2017)

c. Stars around supermassive BHs “float” (Fujita, Cardoso 2017)

d. Fields can interact with and pile up at center of stars, leading to characteristic behavior (Brito, Cardoso, Okawa 2016, Brito+2016)

e. Vector fields can form self-gravitating Proca stars (Brito+2016)

f. All of above hinges on rotational superradiance. Proposal to detect (Cardoso+2016) was recently implemented (Torres+ 2017)

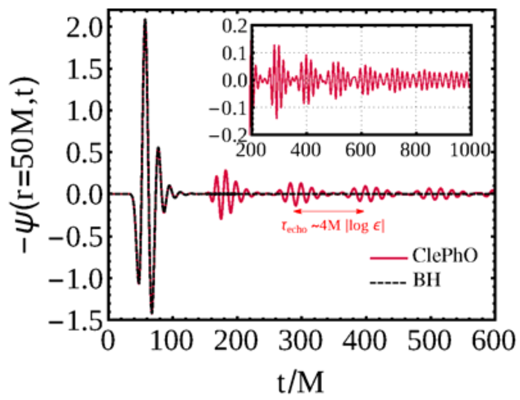
Phenomenology of non-Kerr black holes

a. Shadows can distinguish black holes with fundamental bosonic hair (more difficult in other models like Einstein-dilaton-Gauss-Bonnet) (Vincent+2016, Cunha+2016, Cunha+2017)

b. The iron-Kalpha-iron line technique can be used to distinguish solitonic objects and hairy black holes from Kerr black holes (Ni+2016, Cao+2016, Zhou+2017)

c. Quasi-Periodic Oscillatons can be used to constrain fundamental fields around black holes (Franchini+2017)

New physics and strong-field gravity



a. Near-horizon modifications lead to characteristic imprints ("echoes") (Cardoso+2016, 2017)

b. Inspiral is modified by absorption or tidal effects (Cardoso+2017)

c. Stars around supermassive BHs "float" (Fujita, Cardoso 2017)

d. Detection of GWs from ringdown will lead to tests of no-hair results (Cardoso & Gualtieri 2016; Berti+2016; Cardoso+2016; Blázquez+2016)