

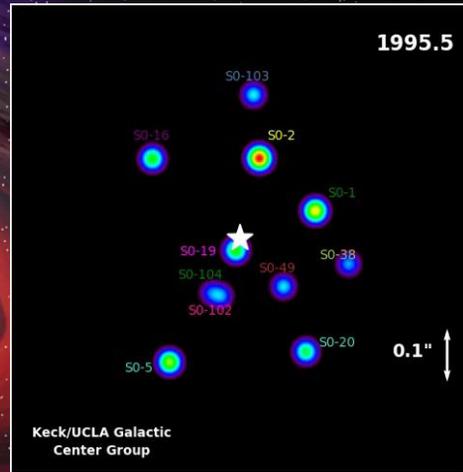
Discovering Stars Disrupted by Black Holes



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What lies at the core of each galaxy?

- There is a supermassive black hole in the center of almost every galaxy including the Milky Way.
- But, we still do not understand how these supermassive black holes are formed



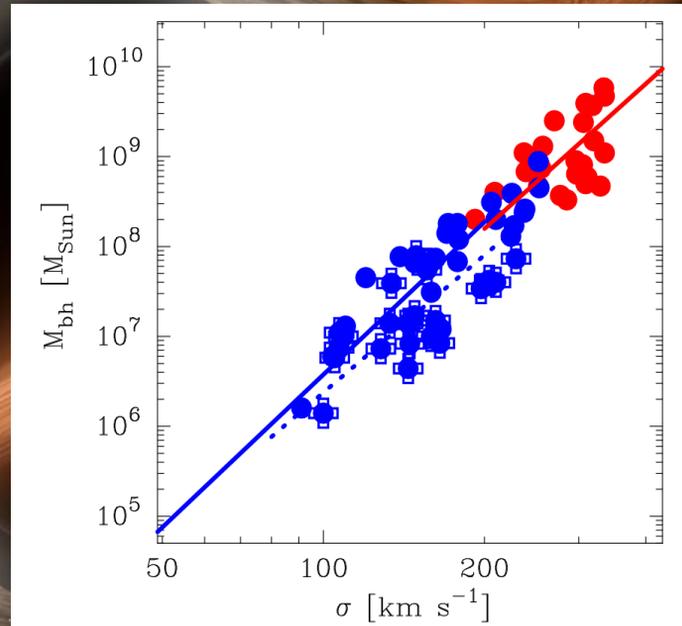
These images/animations were created by Prof. Andrea Ghez and her research team at UCLA and are from data sets obtained with the W. M. Keck Telescopes.

Correlation between Black Hole Mass & Galaxy Mass

- There exist a growth evolutionary relationship between the mass of the SMBH and the velocity dispersion of its host galaxy (M- σ relationship)

Why?

- We have yet to know. Thus we need to devise a method to discover inactive SMBH at larger distances.



Variation of the (black hole mass)–(velocity dispersion) from Graham & Scott (2013).

Blue = Sérsic galaxies, Red = core Sérsic galaxies

Proposed method: Observing Tidal Disruption Events (TDEs)

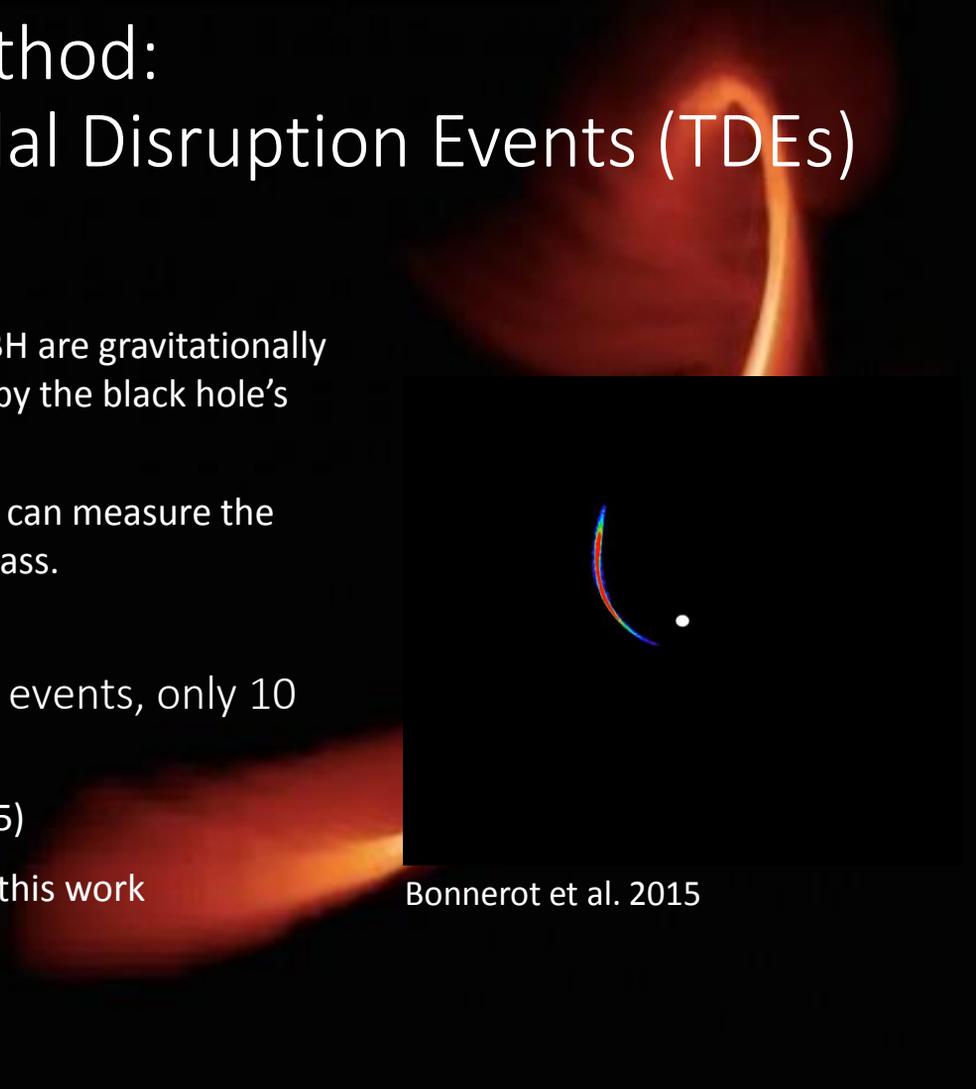
When it occurs?

- Stars that orbits a SMBH are gravitationally bound and torn apart by the black hole's tidal forces
- By observing TDEs, we can measure the inactive black hole's mass.

TDEs – Extremely rare events, only 10 have been observed

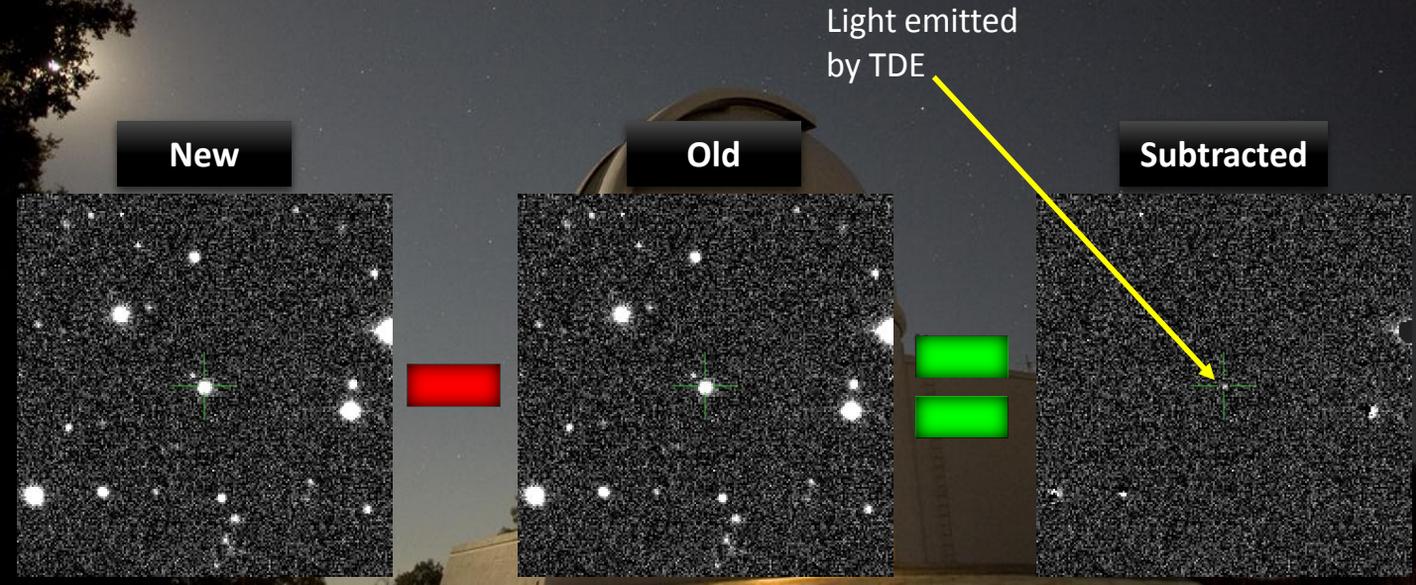
- 2 found this year (2015)
- 1 out of 2 found from this work

Bonnerot et al. 2015

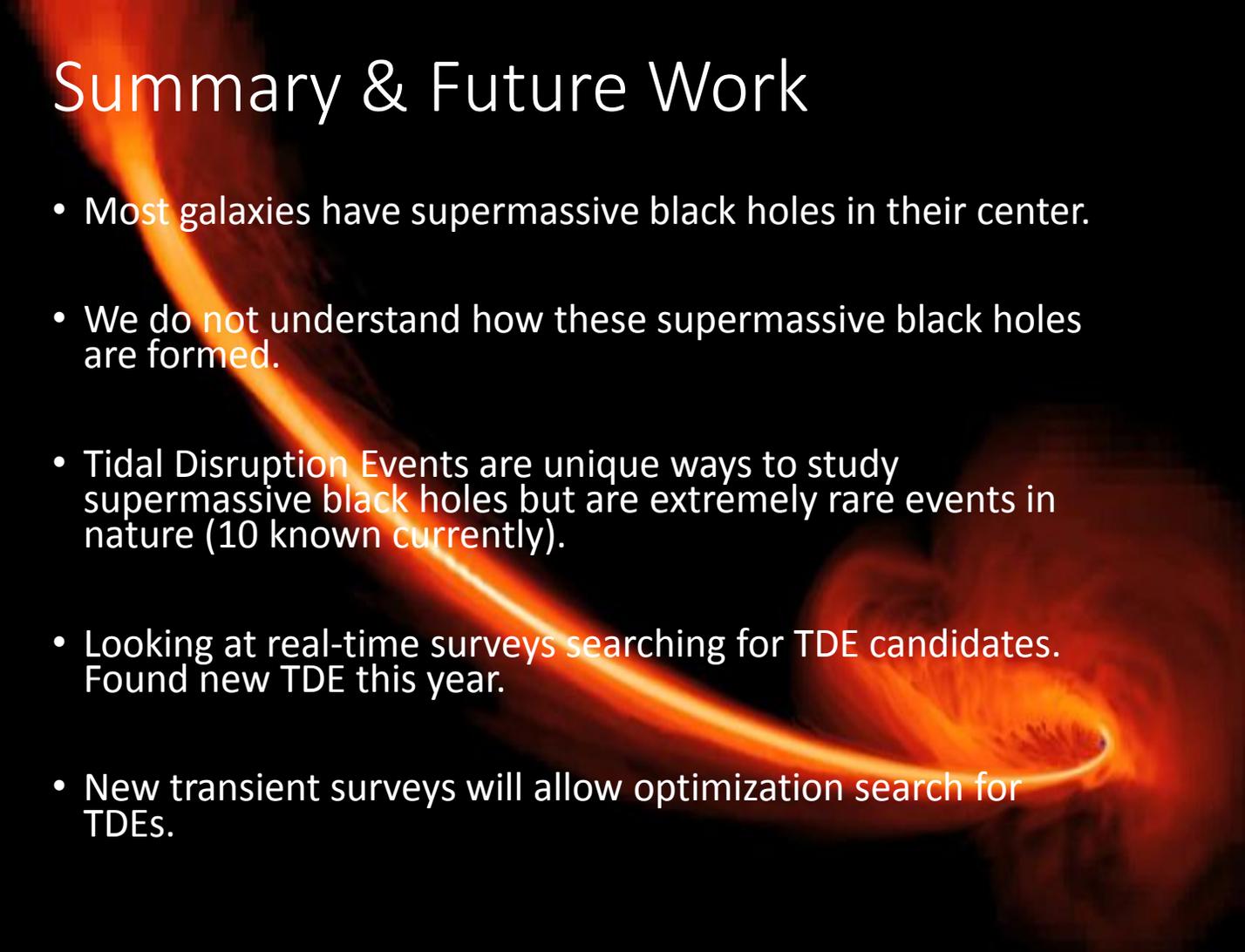


How do we find them?

- Wide-field transient surveys (PTF, Gaia, Pan-STARRS, OGLE, LSQ)
- Events in center of galaxies
- Cross-referencing with historical databases
- Assign for spectral classification and additional observations



Summary & Future Work



- Most galaxies have supermassive black holes in their center.
- We do not understand how these supermassive black holes are formed.
- Tidal Disruption Events are unique ways to study supermassive black holes but are extremely rare events in nature (10 known currently).
- Looking at real-time surveys searching for TDE candidates. Found new TDE this year.
- New transient surveys will allow optimization search for TDEs.