Key points from Lecture 19 of ASTR 350

1. Even if a galaxy has a supermassive black hole (SMBH), it is relatively rare in the current universe that it is actively accreting a lot of gas, which means that it is rare that a SMBH is an AGN.
2. However, every once in a while (maybe every $\sim 10^4$ years per galaxy), a star wanders too close and is ripped apart.
3. This can give us a lot of information about the SMBH, including estimates of its mass and spin parameter (although there is a lot of astrophysics involved, which means that the inferences aren't absolutely solid!).
4. This can also give us information about the accretion process itself, given that the accretion rate goes from zero, to a lot, to diminishing over time.
5. The physics of tides means that the distance out to which a given star will get ripped apart by a SMBH of mass M is proportional to $M^{1/3}$. Since the event horizon radius is proportional to M, this means that for a given star there is a mass $M_{\rm max}$ of a SMBH above which the star is only ripped apart *inside* the SMBH, so we can only see the effects below $M_{\rm max}$. $M_{\rm max}$ depends a little on the spin parameter, but for Sun-type stars, typically $M_{\rm max} \sim 10^8\ M_\odot$.
6. Tidal disruption of ordinary stars by ordinary SMBHs is very general relativistic; you don't do very well using just Newtonian physics.