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## Gravitational lensing measurements of the Hubble parameter: challenges and opportunities

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The time delay between the images of gravitationally lensed quasars probes a combination of angular diameter distances and the mass profile of the lens galaxy. Some observational campaigns to measure such systems have reported a determination of the Hubble parameter  $H_0$  in tension with determinations based on the cosmic microwave background and large scale structure. I will discuss challenges and opportunities associated with the lensing  $H_0$  measurements. A central challenge facing the method is the mass sheet degeneracy (MSD). To mitigate the MSD, lensing collaborations must study and constrain cosmological weak lensing distortions to the strong lensing system, which can bias the inferred value of  $H_0$  at the few percent level. I will show that in current  $H_0$  measurements, the weak lensing corrections have not been dealt with in full. Another related challenge is due to uncertainties in the intrinsic density profile of the lens galaxy, notably the possibility of an extended core feature, which could act as an approximate MSD. I will review how a careful account of this possible systematic effect in the observational data analysis had alleviated a previous claim for a lensing  $H_0$  tension. The core-MSD effect is also an interesting opportunity: it could suggest a non-minimal model of dark matter, perhaps a clue for a small relic abundance of ultralight axions.

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