

Observables	Features	What can be constrained	Confounding factors
GWs	<a href="#">&lt; 1 Msun BH</a>	heaviest dark fermion mass, cooling rate, fraction of BH from dark matter, temperature of the dark sector; implication for how much dark matter is dissipative	If dark fermion mass lighter can't make < 1 Msun
	Dark compact objects via tidal deformability + mass measurement	Dark nuclear physics / EOS / dark NS structure	Other BSM but not DM objects
	"mass-gap" mergers -> pop III stars	IMF, (binary) stellar evolution	PBHs, DBHs, repeated mergers...
	"Population features" / bumps / features in distributions		
	Redshift distributions	PBH, DBH, etc	
	Correlation with LSS (black hole bias; metallicity)		
CMB power spectrum		Odd-even peak ratios, less lensing, phase shift	Loses sensitivity for $\chi_i \ll 1$
Galaxy power spectrum	Small scale suppression	Small scale power spectrum	Cannot probe very small scales
Stellar streams	stream kinematics (formation and disruption)	Dark sector mass fraction, Halo profiles, halo mass function, small scale power spec, dark cooling rate	
MMA	Merger in the middle of nowhere, incongruity b/w GW and EM (e.g. NS mass merger with no counterpart but tidal effects measured)		other poorly modeled SM physics/astro, selection effects, localization
21 cm	Shape of global differential brightness temperature, 21 cm angular power spectrum	cooling efficiency, small scale power spectrum, accretion around (dark) BHs	
merging objects (not compact objects)	gas vs mass offset, BCG oscillations, morphology	Halo profile, interaction cross section/cooling rate	
Weak lensing power spectrum	Small scale suppression	small scale power spectrum	
Stellar dynamics	"dynamics with unaccounted for mass"	Halo profile, interaction cross section/cooling rate	Degeneracy with baryonic physics

Strong lensing	lensing anomalies	halo profile, interaction cross section/cooling rate, halo mass function	
Microlensing	microlensing	number densities of dark objects, fraction of dark matter in dark BH	
CMB spectrum	spectral distortion	DM+Baryon interactions, small scale power spectrum	
quiet kilonovae	KN	DM cooling rate	