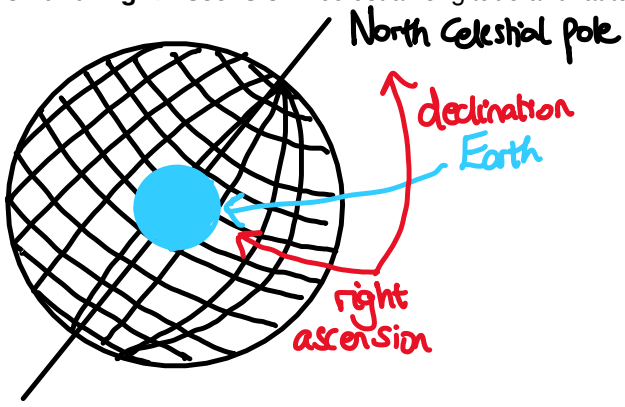
BBH Parameters

Thursday 21 November 2024 23:16

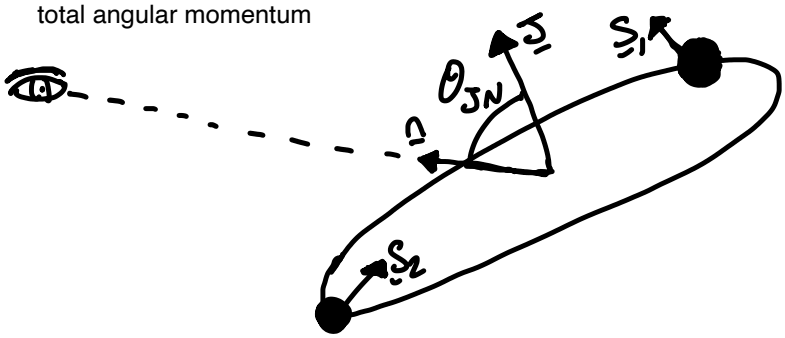
Parameter [Units]	Prior used in Peregrine (up to normalization)
Mass ratio, q	U(0.125, 1)
Chirp Mass, $\mathcal{M}$ [$M_\odot$]	U(25, 100)
Inclination angle, θ_{jn} [rad]	sin(0, π)
Polarisation angle ψ [rad]	U(0, π)
Phase ϕ_c [rad]	U(0, 2π)
Tilt angles θ_1, θ_2 [rad]	sin(0, π)
Dimensionless spins a_1, a_2	U(0.05, 1)
Spin angles ϕ_{12}, ϕ_{jl} [rad]	U(0, 2π)
Right ascension α [rad]	U(0, 2π)
Declination δ [rad]	cos(−π/2, π/2)
Merger time t_c [GPS s]	U(−0.1, 0.1)
Luminosity Distance d_L [Mpc]	U_{vol}(100, 2000) *

* Luminosity distance prior is uniform in the comoving volume in the *source frame*

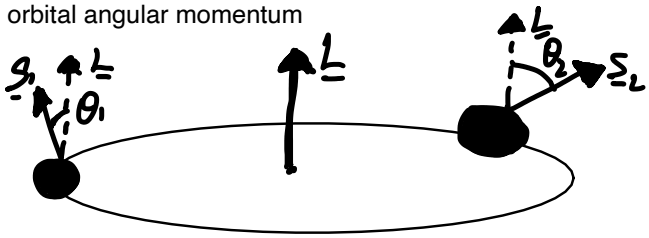
Obvious parameters - **mass ratio, chirp mass, merger time, luminosity distance** (measure of distance that takes into account spacetime curvature
Dimensionless spin - spin (angular momentum) of the black hole divided by GM/c^2 - in the range of 0 (Schwarzschild) to 1 (extremal Kerr)
Phase - phase of the gravitational wave produced at the time of coalescence
Polarisation angle - angle between the detector frame and the GW polarisations
Declination and Right Ascension - celestial longitude and latitude:



Inclination angle - angle between the observer and the binary system's total angular momentum



Tilt angles - angles between the spin vectors of the black holes and the orbital angular momentum



Spin angles - angle between the spin vectors of the black holes, and between the total and the orbital angular momentum of the binary