

- **kerrbb: multi-temperature blackbody model for thin accretion disk around a Kerr black hole**

A multi-temperature blackbody model for a thin, steady state, general relativistic accretion disk around a Kerr black hole. The effect of self-irradiation of the disk is considered, and the torque at the inner boundary of the disk is allowed to be non-zero. This model is intended as an extension to `grad`, which assumes that the black hole is non-rotating. For details see Li et al., *ApJSuppl*, 157, 335, 2005.

- par1 = eta, ratio of the disk power produced by a torque at the disk inner boundary to the disk power arising from accretion. It must be ≥ 0 and ≤ 1 . When eta = 0, the solution corresponds to that of a standard Keplerian disk with zero torque at the inner boundary.
- par2 = specific angular momentum of the black hole in units of the black hole mass M (geometrized units $G=c=1$). Should be ≥ -1 and < 1 .
- par3 = disk's inclination angle (the angle between the axis of the disk and the line of sight). It is expressed in degrees. $i=0$ is for a "face-on" accretion disk. i should be ≤ 85 degree.
- par4 = the mass of the black hole in units of the solar mass.
- par5 = the "effective" mass accretion rate of the disk in units of 10^{18} g/sec. When eta = 0 (zero torque at the inner boundary), this is just the mass accretion rate of the disk. When eta is nonzero, the effective mass accretion rate = $(1+\text{eta})$ times the true mass accretion rate of the disk. The total disk luminosity is then "epsilon" times "the effective mass accretion rate" times " c^2 ", where epsilon is the radiation efficiency of a standard accretion disk around the Kerr black hole
- par6 = the distance from the observer to the black hole in units of kpc.
- par7 = spectral hardening factor, $T_{\text{col}}/T_{\text{eff}}$. It should be greater than 1.0, and considered to be 1.5-1.9 for accretion disks around a stellar-mass black hole. See, e.g., Shimura and Takahara 1995, *ApJ*, 445, 780
- par8 = a flag to switch on/off the effect of self-irradiation (never allowed to be free). Self-irradiation is included when > 0 . Self-irradiation is not included when ≤ 0 .
- par9 = a flag to switch on/off the effect of limb-darkening (never allowed to be free). The disk emission is assumed to be limb-darkened when > 0 . The disk emission is assumed to be isotropic when lflag is ≤ 0 .
- K = normalization. Should be set to 1 if the inclination, mass and distance are frozen.