

Challenges for the R. ApP. & Pl. Phys. C.

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Two Black holes dance and merge: maximal CR interaction and neutrino production

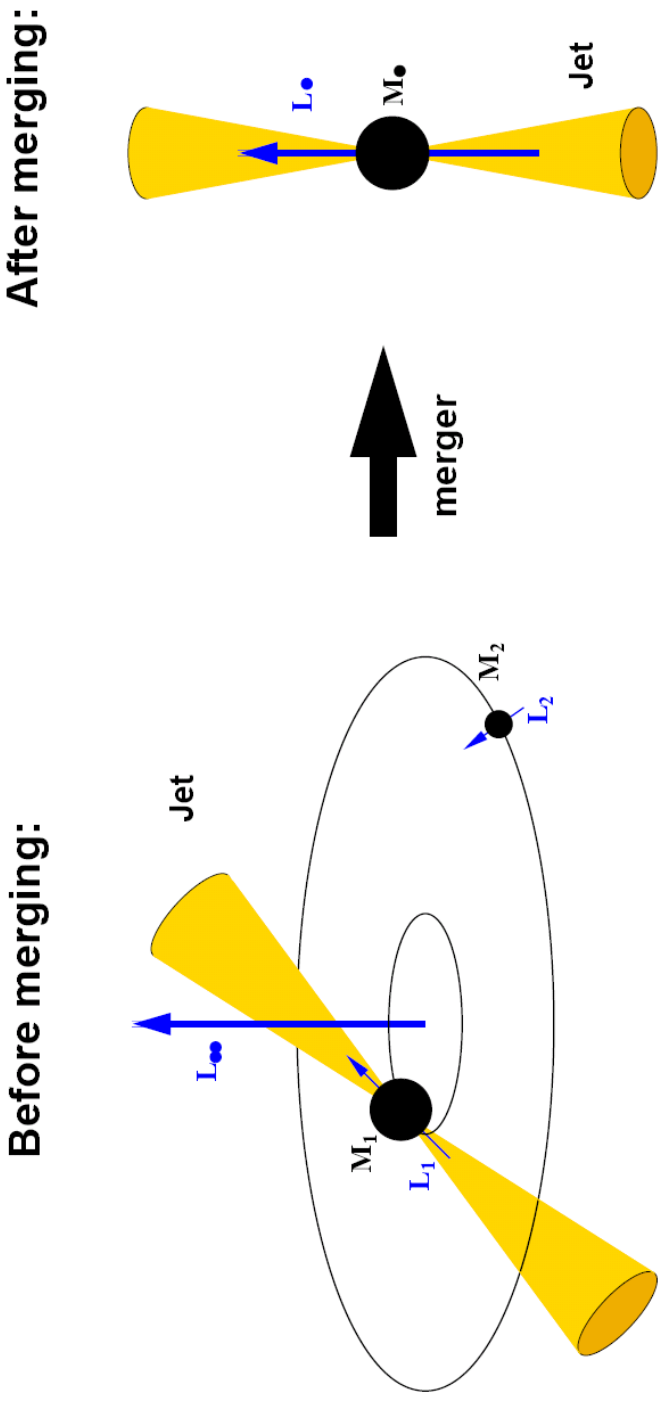


Figure 1 This figure illustrates the change of the direction of the spin of the BH, induced by the merger of 2 massive BHs, and consequently the change of the direction of the jet. Basically the orbital spin wins over the two intrinsic spins. The left panel shows the situation before the merger, when the jet is aligned with the individual spin of the primary black hole of the binary system (Zier & Biermann 2001, 2002).

**The Grand Arc: BHs $> 3 \cdot 10^7 M_{\odot}$:
distance: Black, Blue, Green, Orange, Red:
 ~ 100 Mpc correlated scale of AGN**

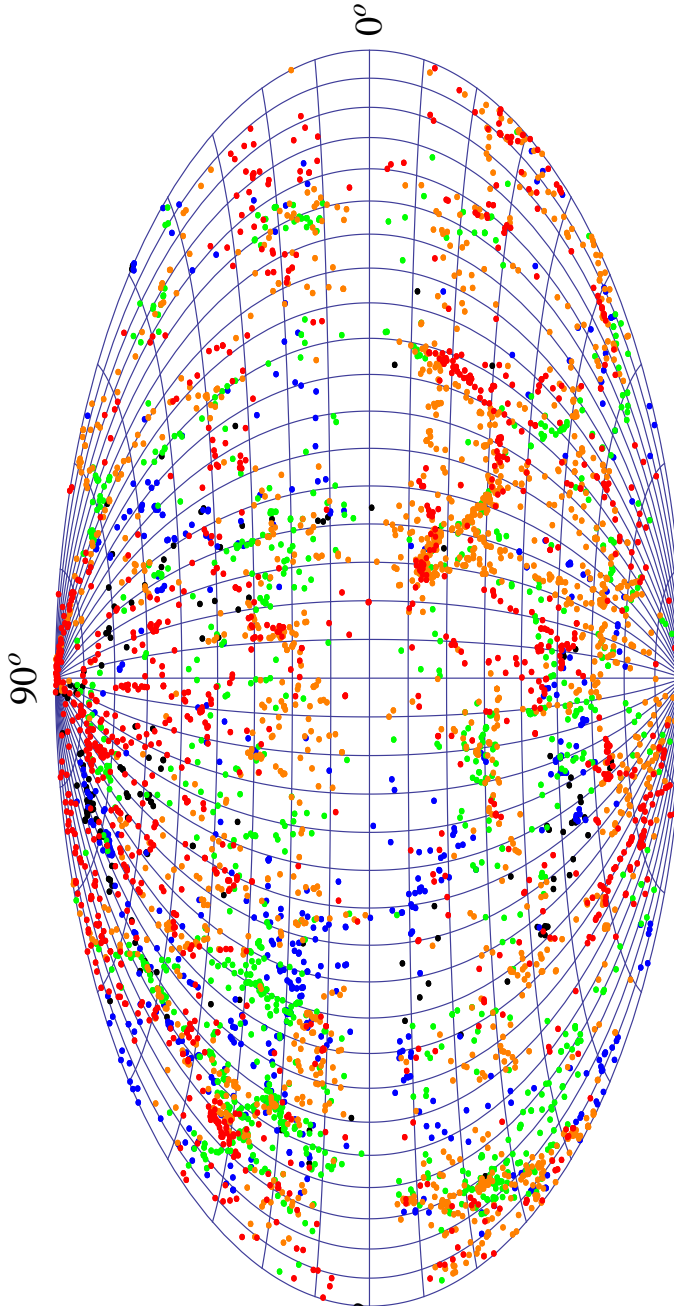


Figure 2 The sky in black holes, $\approx 3 \cdot 10^7 M_{\odot}$: The color code corresponds to distance: Black, Blue, Green, Orange, Red for the redshifts intervals 0, 0.005, 0.01, 0.015, 0.02, 0.025, corresponding to distance intervals of 0, 60, 120, 180, 240, and 300 million light-years: (—) Caramete & PLB 2011); coordinate system with Galactic plane across center, and Galactic Center (GC) at the right edge

UHECRs (ZeV), HE ν s (PeV), γ -photons (TeV) and GWs (μ -Hz to hundreds of Hz) ?

- **Massive star explosions and binary BH formation**
- **Stellar BHs \rightarrow GWs, γ -photons, neutrinos, CRs: seen in the North by TA**
- **Super-massive BH mergers \rightarrow reoriented jet: maximal interaction**
- **\rightarrow GWs, γ -photons, neutrinos, UHECRs: seen in the South by Auger**
- **PKS 0723-008, 4C+00.81: IceCube !**