add figure captions and comments

Xiaoqi Yu

PACS numbers:

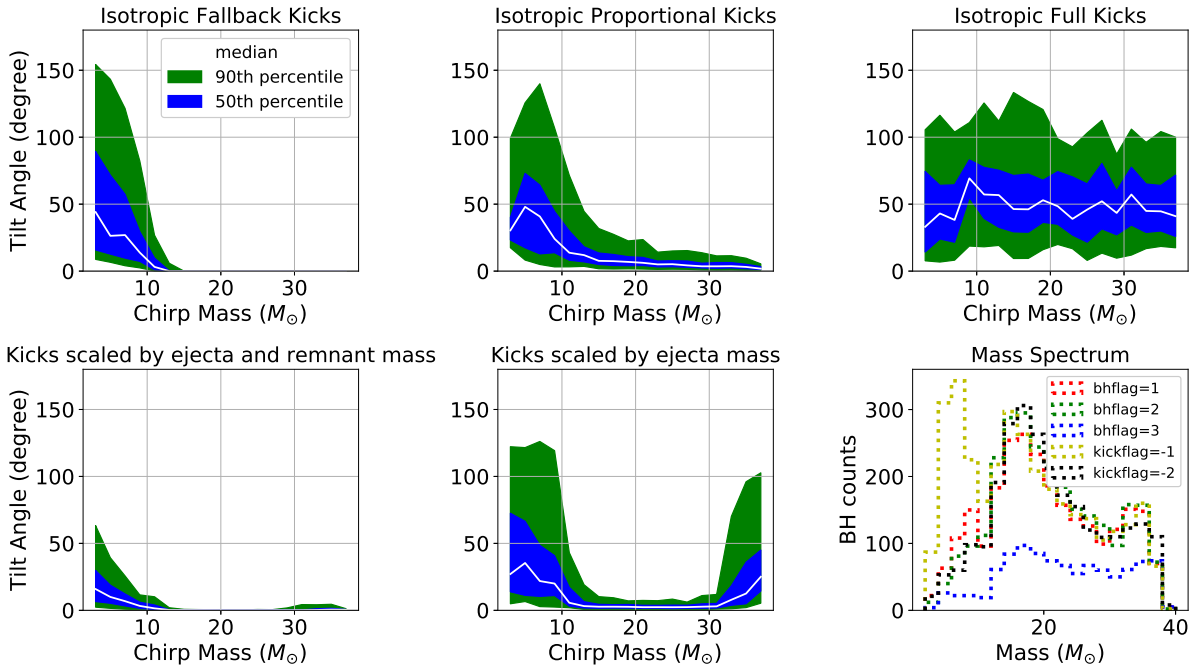

FIG. 1: Spin-Orbit alignment for merging binaries in galactic field. The five subplots correspond to five supernova kick models, each shows the tilt angle distributions across binary chirp masses. The 6th plot shows chirp mass distribution for each supernova kick models

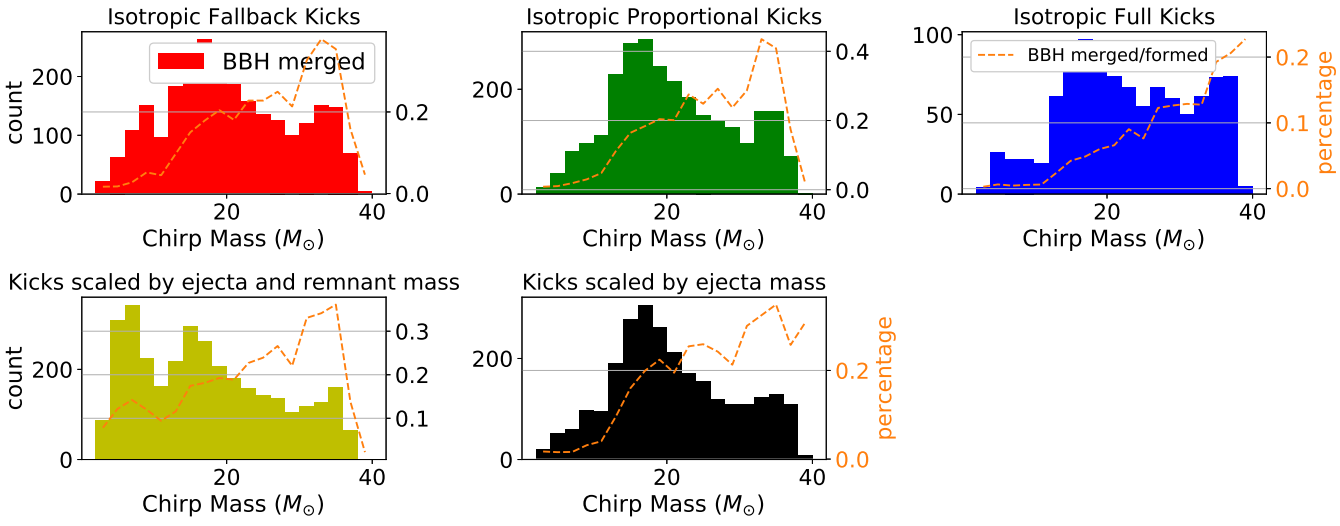

FIG. 2: Chirp mass distribution for merging binaries in galactic field. The histograms for merging binary chirp masses are shown in each subplot, and the orange lines show the fractions of binary formed at each mass bin that are eventually merged within hubble time

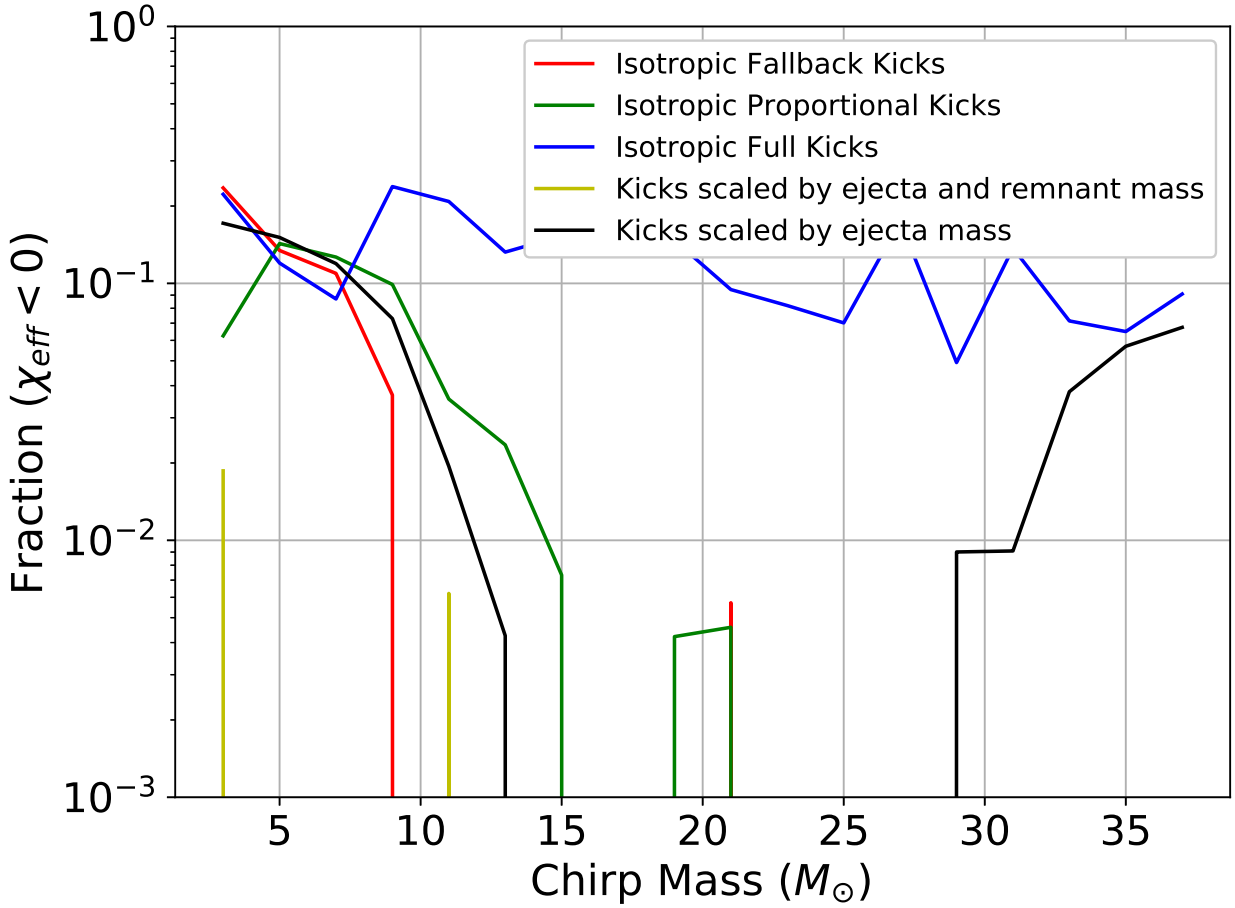

FIG. 3: Fraction of Chi effective greater than 0.

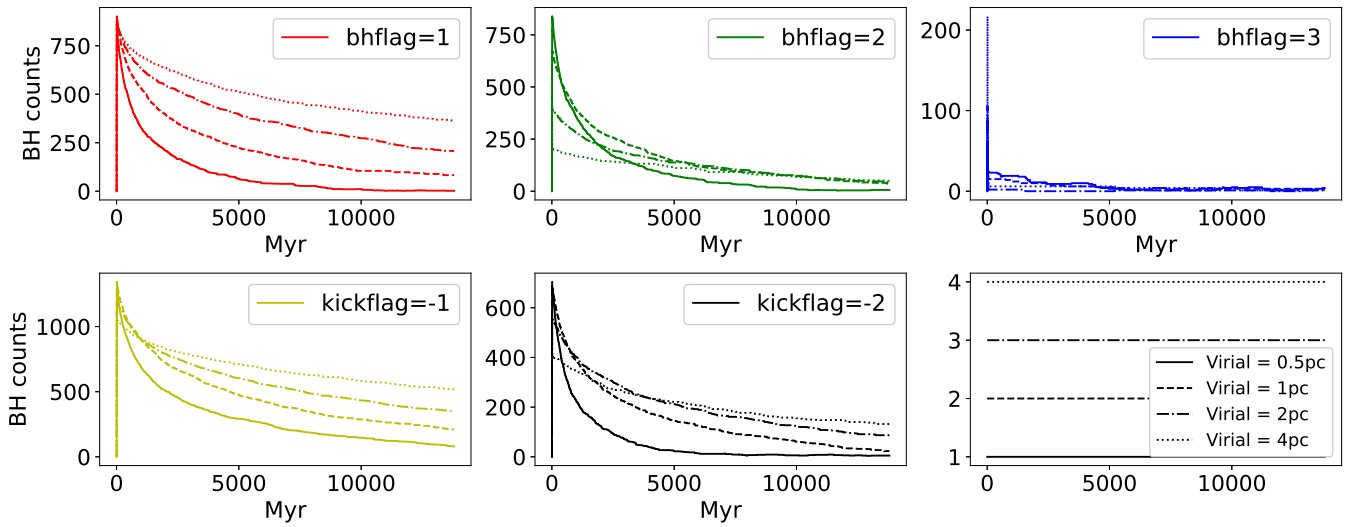

FIG. 4: Number of black holes in clusters over time.

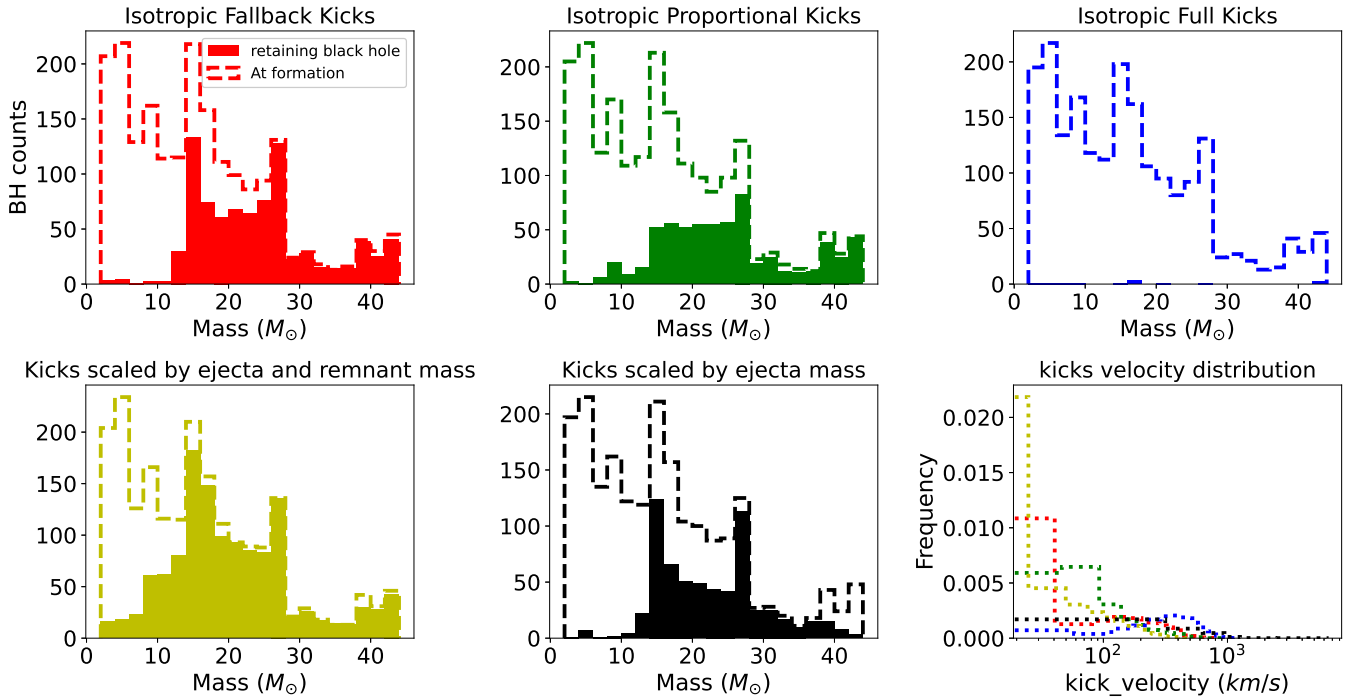

FIG. 5: Black hole mass distribution at formation(in dashed lines), and at the time of maximum black hole counts in cluster(in solid fillings). This shows the effects of supernova kicks alone on black hole mass distribution, not considering dynamical encounter at later time

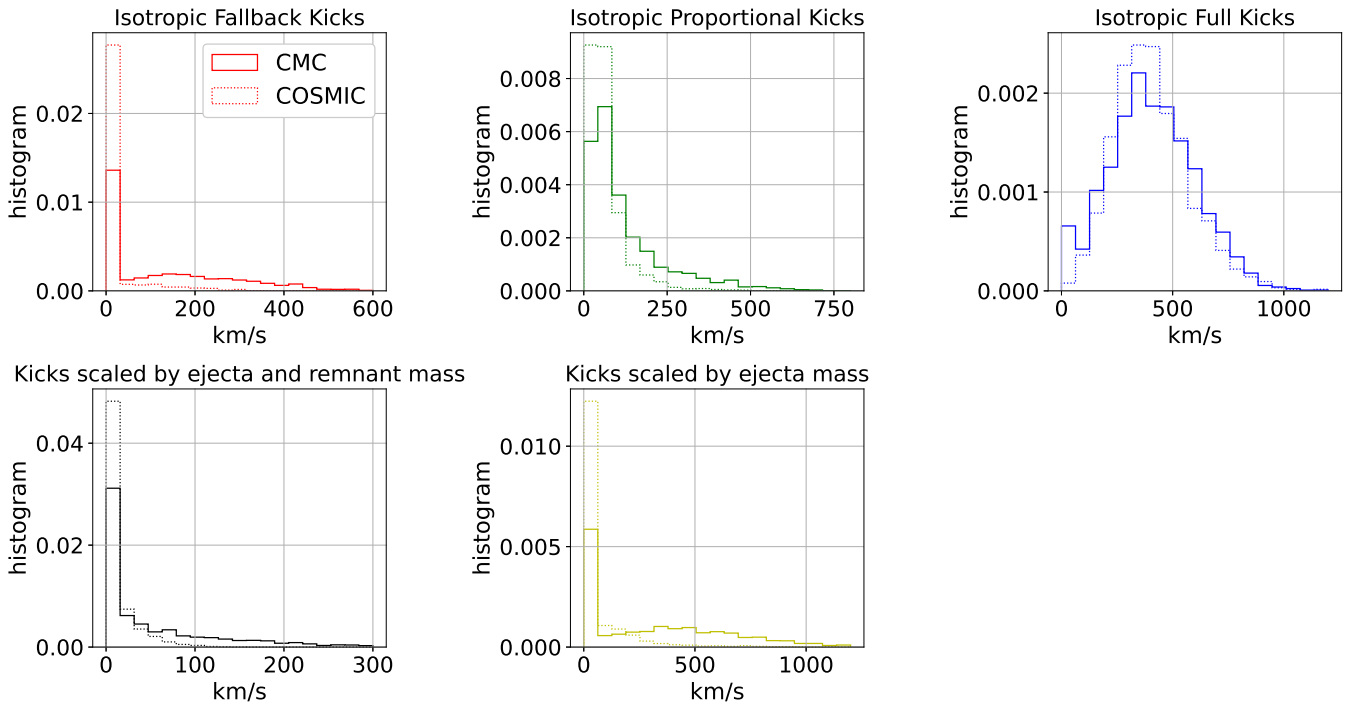

FIG. 6: Supernova kick velocity distribution in cluster and in galactic field

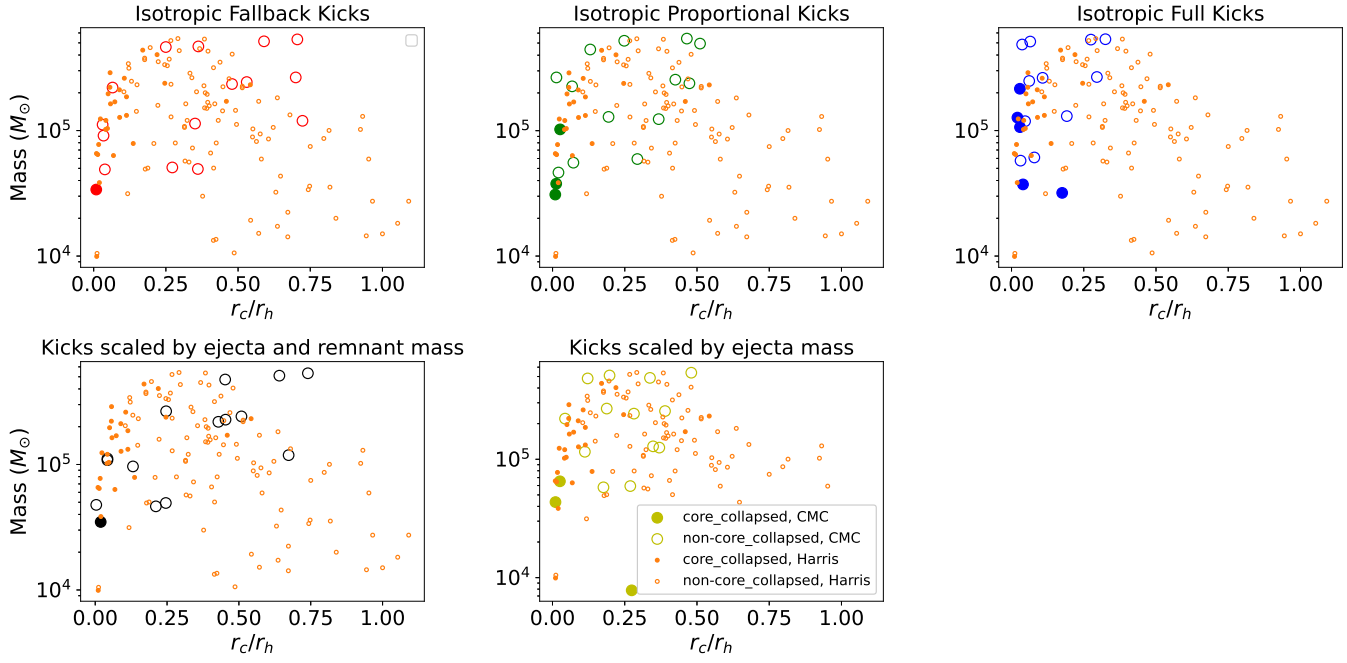

FIG. 7: Mass versus Core to half radius for clusters. The five panels show 5 supernova kick model respectively. The core-collapsed clusters are shown with solid fillings, and the none core-collapsed are hollow. The clusters in simulation are compared against Harris Catalog in orange, which are from observed clusters in milky way

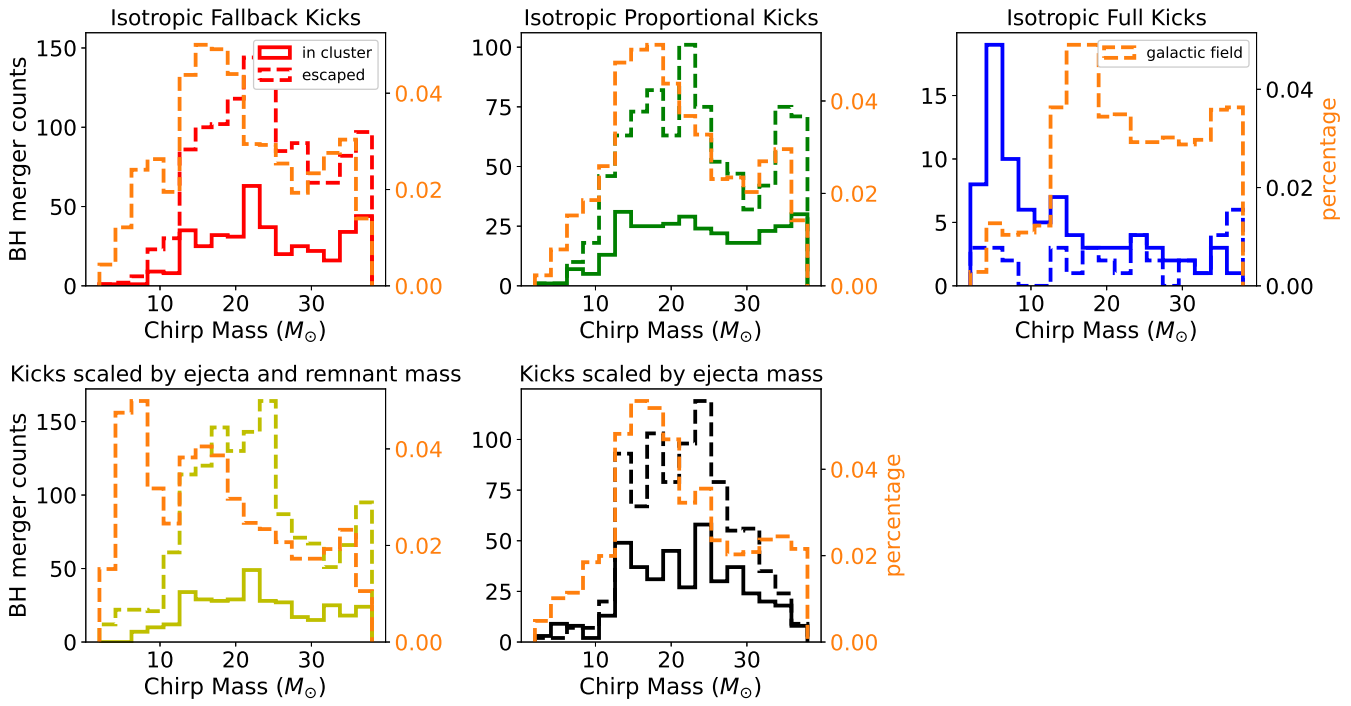

FIG. 8: Chirp mass distribution for black hole mergers. The mergers in cluster are shown in solid line, and the mergers escaped from clusters are shown in dashed line. In order to compared to galactic mergers, we plot chirp mass distribution for each kick models from COSMIC in orange. We cut the upper limit for chirp mass at 38 solar masses, because mergers with higher chirp mass than that have cluster origin (is that true though?). (also, interestingly, full kick doesn't seem to form a lot of binaries. It's the only kick model that results in more binary mergers in cluster other than escaped)