

Statistics of transneptunian binaries

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More than 50 transneptunian binaries (TNB) are known, with all but Charon having been discovered since 2001. The sample size is now large enough that interesting statistical information can begin to be derived from discovery data alone. In general, three pieces of information are returned from the successful identification of a TNB: separation, relative magnitude, and the fraction of searched objects that are binary.

The separation of TNB components at discovery is a randomly timed sample of the possible separations over the course of a TNB orbit. The apparent angular separation is a function of the TNB's orbital elements and is subject to strong observational biases. It is possible to show, nonetheless, that the ensemble distribution of separations closely reproduces the distribution of semimajor axes. We find that the fraction of binaries increases rapidly at smaller separations down to the limit of HST resolution.

The relative magnitude of TNB components is a measure of the relative sizes of these bodies (assuming equal albedo). We find a marked preference for similar-sized binaries, particularly among Classical TNBs.

Finally, we have found a remarkable concentration of TNBs among low-inclination Classicals with an equally notable absence at higher inclinations. This difference can be best explained if the low and high inclination Classicals originated in different parts of the early protoplanetary nebula.