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Streams of interstellar objects

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Upcoming surveys are likely to discover a new sample of interstellar objects (ISOs) within the Solar System, but questions remain about the origin and distribution of this population within the Galaxy. ISOs are ejected from their host systems with a range of velocities, spreading out into tidal streams. We simulate ISO streams orbiting in the Galaxy, and derive a simple model for their density distribution over time. We then construct a population model to predict the properties of the streams in which the Sun is currently embedded. We find that the number of streams encountered by the Sun is quite large, $\sim 10^6$ or more. However, the wide range of stream properties means that for reasonable future samples of ISOs observed in the Solar System, we may see ISOs from the same star ("siblings"), and we are likely to see ISOs from the same star cluster ("cousins"). We also find that ISOs are typically not traceable to their parent star, though this may be possible for ISO siblings. Any ISOs observed with a common origin will come from younger, dynamically colder streams.