

A Search for Planet Nine with Far-Infrared All-Sky Surveys Data

Wednesday, 13 March 2024 15:35 (5 minutes)

Various recent data analyses and modeling simulations provide strong evidence of a giant distant planet in the outer region of the solar system, which is also known as Planet Nine or Planet X. However, the existence of this planet has not been demonstrated by observations. Since it is more difficult to detect the reflected sunlight from Planet Nine than its thermal radiation, infrared surveys using space telescopes are ideal for finding this mysterious planet. In this study, we conduct a search for Planet Nine by analyzing the data from two far-infrared all-sky surveys such as Infrared Astronomical Satellite (IRAS) and AKARI Space Telescope, whose operating times are separated by 23.4 years. The internal thermal emission at $90 \mu m$ and proper motion of Planet Nine are estimated in a mass range of $5 - 17 M_{Earth}$. Our work covers the distance range of 300 - 1000 AU between Sun and Planet Nine. A set of criteria is listed for position and flux selection after eliminating all non-moving sources between catalogues. We finally obtained a shortlist of potential candidates including 166 IRAS sources and 1028 AKARI sources. Then, we started to evaluate their cutout images.

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Session Classification: Poster

Track Classification: Poster section