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# The Radiation Environment of the Jovian Circumplanetary Disk

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## Abstract

The Galilean satellites are thought to have formed from a circumplanetary disk (CPD) surrounding the young Jupiter [1]. Once reaching a critical mass, Jupiter opened an annular gap in the circumstellar disk [2], potentially exposing the CPD to external radiation from the young sun or from the stellar cluster in which the solar system was created. High mass stars in the cluster contribute to a time-varying interstellar radiation field which can heat and drive photoevaporative processes in gaseous disks [3].

Our aim is to investigate the far-ultraviolet radiation field to which the CPD is exposed to understand the relative contributions of the planetary, stellar, and interstellar sources of heating and the potential consequences for the CPD and icy satellite formation. This will allow us to determine whether the properties of Jupiter's satellite system are a unique consequence of its birth environment.

We create a simulation of the stellar birth cluster of the Sun and determine the intensity of the resulting interstellar FUV radiation for an ensemble of possible solar orbits. We employ analytical annular gap profiles to build a range of plausible gap geometries informed by hydrodynamical simulations. We use the radiation thermo-chemical model ProDiMo to perform ray-based radiative transfer in the young solar nebula at multiple evolutionary stages to establish the properties of the radiation field within the Jovian gap, as well as to investigate the resulting effects on the temperature structure and possible mass outflow of the CPD.

## References

[1] Canup, R.M., and Ward, W.R.: Formation of the Galilean Satellites: Conditions of Accretion, The Astronomical Journal, Volume 124, Issue 6, pp. 3404-3423, 2002.

[2] Crida, A.,Morbidelli, A., and Masset, F.: On the width and shape of gaps in protoplanetary disks, Icarus, Volume 181, Issue 2, p. 587-604, 2006.

[3] Adams, F.C.:The Birth Environment of the Solar System, Annual Review of Astronomy and Astrophysics, vol. 48, p.47-85, 2010.