
[JJ] Eveningポスター発表 | セッション記号 P (宇宙惑星科学) | P-PS 惑星科学

[P-PS08] 惑星科学

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本セッションでは、広く惑星科学に関する研究発表と議論を行う。惑星科学とは、地球や他の惑星をはじめとする太陽系や系外惑星系の現在・過去・未来に関する様々な研究からなる学問であり、幅広い視点からの議論が望まれる。

[PPS08-P13] Temperature Structure of Weakly-Ionized Protoplanetary Disks

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The temperature profile of protoplanetary disks is a key parameter to understand planet formation. Accretion heating determines the gas temperature of inner protoplanetary disks in early evolutionary stage. The conventional temperature model is based on the classical accretion heating model where the Shakura-Sunyaev alpha parameter is vertically constant. However, magnetohydrodynamic (MHD) simulations showed that vertical profile of the alpha parameter depends on MHD effects. We investigate the vertical temperature profile in protoplanetary disks whose dynamics is controlled by magnetic fields with the effects of partial ionization. We find that for our fiducial disk model, Joule heating occurs at three scale heights above the midplane due to the large ambipolar diffusion at the midplane. The absence of Joule heating near the midplane leads to the midplane temperature significantly lower than the temperature determined by stellar irradiation. Our parameter study shows that in most cases, the classical accretion heating model significantly overestimates the midplane temperature. Our results suggest that the midplane temperature in disks' inner region is determined by irradiation heating rather than accretion heating in early stage of disk evolution.