P112a Witnessing the fragmentation of filaments into prestellar cores in Orion B/NGC 2024

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Herschel observations of nearby clouds have shown that filamentary structures are ubiquitous and that most prestellar cores form in filaments. Thus, probing the fragmentation of filaments into cores is crucial to improve our observational understanding of the star formation process. We mapped the NGC 2024 region in $H^{13}CO^+$ (1–0) to investigate how observed filaments are fragmenting into cores. The emission traces the filamentary structure seen in *Herschel*. The $H^{13}CO^+$ centroid velocity map reveals a velocity gradient along both the major and the minor axis of the filament, as well as velocity oscillations with a period $\lambda \sim$0.2 pc along the major axis. Comparison between the centroid velocity and the column density distribution shows that there is a tentative $\lambda/4$ phase shift between the two distributions. We produced a toy model taking into account a transverse velocity gradient, a longitudinal velocity gradient, and a longitudinal oscillation mode caused by fragmentation. Examination of synthetic data shows that the longitudinal oscillation component produces an oscillation pattern in the velocity structure function (VSF) of the model. As the $H^{13}CO^+$ VSF does show an oscillation pattern, we suggest that our observations are partly tracing core-forming motions and fragmentation of the filament into cores.