P130a Probing fragmentation and velocity sub-structure in the NGC 6334 filament

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Herschel imaging surveys of Galactic interstellar clouds support a paradigm for low-mass star formation in which dense molecular filaments play a crucial role. The detailed fragmentation properties of star-forming filaments remain poorly understood, however, and the validity of the filament paradigm in the high-mass regime is still unclear. In order to investigate the detailed density and velocity structure of the main filament in the high-mass star-forming region NGC6334, we conducted ALMA 3mm and N_2H^+(1-0) observations at a resolution of ∼0.025 pc. We identified 21 dense cores at 3mm and 5 velocity-coherent fiber-like structures in N_2H^+, within the main filament. The 3mm sources have a median mass of $\sim 9M_{\rm sun}$ and can be divided into 7 groups of cores, closely associated with dense clumps seen in the ArTeMiS 350μm data. The projected separation between dense cores and the projected spacing between ArTeMiS clumps are roughly consistent with the effective Jeans length in the filament and a physical scale of about four times the filament width, respectively. These two distinct separation scales are suggestive of a two-level fragmentation process in the filament. The typical length and velocity difference between the fiber-like structures of the NGC6334 filament are reminiscent of the properties for the fibers of the low-mass star-forming filament B211/213. The NGC6334 filament has a density/velocity structure which is qualitatively very similar. This suggests that dense molecular filaments may evolve and fragment in a similar manner in low- and high-mass star-forming regions.