NOEMA OBSERVATIONS OF COMPLEX ORGANIC CHEMISTRY IN THE W3 STAR-FORMING REGION

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The process of star formation provides a rich environment for complex interstellar chemistry to occur. We are able to probe the physical and chemical processes of star and planet forming regions in detail using high resolution millimeter wave interferometry. We have used the Northern Extended Millimeter Array (NOEMA) to conduct observations of complex organic molecules (COMs) within the W3 star forming region at selected frequencies in the λ=2 mm band. W3 is a binary system with two high-mass hot cores centered on masers, W3(OH) and W3(H2O). The two cores display different chemistry despite being formed from the same interstellar cloud. This difference in chemistry may arise either because of a difference in source age, or because of different physical conditions within the sources. Interferometric observations of molecules in this region allow us to disentangle the spatial distribution of COMs and investigate the drivers of chemical differentiation between the two star-forming cores. Our results show the chemical morphology of prebiotically relevant molecules such as methanol, methyl formate, methyl cyanide, and formaldehyde, as well as kinematics and temperature distributions within the W3 complex. We will report on these findings and discuss the results in the context of interstellar prebiotic chemistry.