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Geometric and Isotopic Influences on the Fragmentation Patterns of Rapidly Ionized Methane and Ammonia[1] LAURA DOSHIER, AMY LUEKING, IVAN LEE, ERIC WELLS, Department of Physics, Augustana College, Sioux Falls, SD 57197, ELI PARKE, MAT LEONARD, KEVIN D. CARNES, ITZIK BEN-ITZHAK, J.R. Macdonald Laboratory, Department of Physics, Kansas State University, Manhattan, KS 66506 — The fragmentation branching ratios of (deuterated) ammonia and methane ionized by 19 MeV F^{7+} and 4 MeV H^+ projectiles have been measured with an emphasis on dissociation channels that require bond rearrangement. For these projectiles, the collision time is approximately 10 attoseconds, a duration over which nuclear motion is negligible. As a result, the rearrangement occurs during the post-collision dissociation process and nuclear mass plays a role. Production of H_2^+ and H_3^+ ions, in coincidence with either neutral or ionic fragments, was analyzed for these eight collision systems. Statistically significant isotopic effects are observed in some (*e.g.* $H^+ + NH_3^+ \rightarrow H^+ + N + H_3^+$), but not all (*e.g.* $F^{7+} + NH_3^+ \rightarrow F^{7+} + N + H_3^+$), dissociation pathways.

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