Dissociative recombination of HCl+, H₂Cl+, DCl+, and D₂Cl+ (300-500 K), and the astrophysical relevance. T. M. MILLER, J. P. WIENS, N. S. SHUMAN, A. A. VIGGIANO, Air Force Research Laboratory — A review by Neufeld and Wolfire¹ pointed out the unique chemistry of chlorine in the interstellar medium (ISM), including (a) Cl is the only species in the ISM with an IE less than that of H atom, which allows Cl+ to survive among an abundance of H atoms; (b) those Cl+ can react with H₂ to form HCl+ exothermically; and (c) HCl+ can in turn react with another H₂ to form H₂Cl+. Only in the past 6 years have HCl+ and H₂Cl+ been observed in the ISM. Modeling the true quantities of chlorinated species in the ISM requires knowing dissociative recombination (DR) kinetics for HCl+ and H₂Cl+. We have used a flowing afterglow apparatus to measure DR rate coefficients at 300-500 K for HCl+, H₂Cl+, DCl+, and D₂Cl+. For 300 K, we find 7.7 x 10⁻⁸ cm³/s (HCl+), 2.6 x 10⁻⁷ cm³/s (H₂Cl+), and 1.1 x 10⁻⁷ cm³/s (D₂Cl+), each with ~ 35% accuracy. The DR rate coefficient for DCl+ is too slow for us to measure, especially in the face of dealing with mixed H/D species formed in apparatus feedlines when introducing DCl. Novotný, et al.² have carried out storage ring measurements in Heidelberg on this problem and will soon report new results over a wide electron energy range and including neutral product information.