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标题: THE ROTATIONAL SPECTRUM OF HCl+
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摘要: The rotational spectrum of the radical ion HCl+ has been detected at high resolution in the laboratory, confirming the identification reported in the accompanying Letter by De Luca et al., in diffuse clouds toward W31C and W49N. Three rotational transitions, one in the ground-state (2)Pi(3/2) ladder and two in the (2)Pi(1/2) ladder (643 cm(-1) above ground), were observed in a microwave discharge of He and HCl. Well-resolved chlorine hyperfine structure and.-doubling, and the detection of lines of (HCl+)-Cl-37 at precisely the expected isotopic shift, provide conclusive evidence for the laboratory identification. Detection of rotational transitions in the (2)Pi(1/2) ladder of HCl+ for the first time allows an experimental determination of the individual hyperfine coupling constants of chlorine and yields a precise value of eQq(2). The spectroscopic constants obtained by fitting a Hamiltonian simultaneously to our data and more than 8000 optical transitions are so precise that they allow us to calculate the frequencies of the (2)Pi(3/2)J = 5/2-3/2 transition observed in space to within 0.2 km s(-1), and indeed, those of the strongest rotational transitions below 7.5 THz, to better than 1 km s(-1).
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