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Electrical Conduction in Pure Water – Trapping and Scattering of Positive Protons and Negative Proton Holes BINBIN JIE, CHIHTANG SAH, Professors of Physics, Xiamen University, China — Water has been characterized by hydronium $(H_3O)^{1+}$ and hydroxide $(HO)^{1-}$ ions, which fail to explain the electrical conductivity of even pure water. Experimental formulas of pure water versus temperature (0-100C) have employed 39 empirical parameters to fit 3 measured properties: ion concentration, and electrical conductance of pure water and $(H_3O)^{1+}$ ion. We have shown (4 invited talks, 3 articles in 14 months) that electrical conduction in pure water can be represented by 5 quasi-particles in the many-body water lattice: the mobile positively charged protons p^+ and negatively charged proton holes p^-, and the 3 charge states of the immobile water molecule as amphoteric protonic trap, $V^+ = (H_3O)^{1+}$, $V^{0\pm} = (H_2O)^{0\pm}$, and $V^- = (HO)^{1-}$; and as few as 6 physics parameters: 3 binding energies, 1 protonic density of state, and 2 Coulombic scattering strengths. Protons in water are strongly coupled to the protonic-phonons, oxygen-phonons and protonic-local modes. Impuritons and affinitons may be present in the hexagonal tunnels of the water lattices.

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