Fractionally Charged Excitations in Optical Emission Spectroscopy

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We discuss recent experiments and theory of the signatures of fractionally charged excitations in optical emission spectroscopy of two dimensional electrons subjected to a high magnetic field [1]. We show that the two flux quanta in a composite fermion interacting with an exciton lead to filling factor dependent features in optical emission spectrum symmetric around filling factor 1/2 while fractionally charged excitations lead to fractionally charged exciton. In the vicinity of the incompressible filling factor 1/3 state we observe a doublet structure in the emission line, corresponding to excitations of the incompressible fluid. At filling factors lower then 1/3 , corresponding to the transition to a compressible, metallic state, a new emission line appears which is attributed to the fractionally charged quasi-exciton. These observations are supported by extensive numerical calculations of the emission spectrum of finite number of electrons and holes on a Haldane sphere.