Two Magnon Raman Scattering as Indicator for Superconducting to Antiferromagnetic Phase Transition Upon Hydrogenation of YBCO

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Raman spectra of Hydrogenated $YBa_2Cu_3O_{7-x}+H_y$, where y=0.45 and 0.19 is the number of Hydorogen atoms per units cell. The spectra exhibit important changes in the electronic scattering. Upon progressive doping with Hydrogen two magnon scattering features emerge. This coincides with the transition of $YBa_2Cu_3O_{7-x}+H_y$ from superconducting to antiferromagnetic phase. Exchange energy values were obtained from two magnon Raman scattering of the y=0.45 material. It has been found that for y=0.19 the sample has not lost its supercondactivity, and indeed two-magnon scattering has not been observed. However, the situation changed substentially when the doping of the Hydrogen atoms was 0.45. The two-magnon scattering has been observed at different temperatures down to 20^K. The two-magnon energy density exhibits two peak values around $2100cm^{-1}$ and $3000cm^{-1}$.