Fitting of Diverging Effective Mass Obtained by Quantum-Oscillation Measurements in Underdoped YBCO$_{6+x}$ Systems HYUN-TAK KIM, ETRI in Korea — The diverging-effective mass (DEM) in a metallic system is regarded as evidence of strong correlation between fermions in strongly correlated systems. The identity of the DEM still remains to be revealed The effective mass derived from the Brinkman-Rice picture, m*=m$_o$/(1-ρ^4) [1] where ρ is band filling helps clarify the DEM, m*/m$_e$ analyzed by measurements of quantum oscillation in inhomogeneous underdoped YBCO$_{6+x}$ systems [2]. As x decreases, m*/m$_e$ increases rapidly like the DEM [2] When it is assumed as the fact that the metal-insulator transition occurs near a critical x$_c$ $\approx$0.45 the data of the DEM [2] is closely well fitted in condition that ρ =x$_c$/x increases as x decreases. Its physical meaning is a percolation phenomenon that the extent of the metallic regime is constant and the magnitude of the measurement region, x, increases. It's fitting is performed with m*=m$_e$/(1-ρ^4) where ρ =x$_c$/x From the fitting result, we deduce that a correlation strength is greater than 0.95, and conclude that the metal phase of the normal state in YBCO systems is a strongly correlated.

[1] Physica C 341-348(2000)259; e-print arXiv:cond-mat/0110112; Physica C 460–462, 1076 (2007).
[2] PNAS 107 (2010) 6179.

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