# Department of Theoretical Physics

## Special Free Meson Seminar

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| *Speaker* | : | Udit Raha<br>(National Taiwan University) |
| *Topic* | : | Space- and Time-like Electromagnetic Pion and Kaon Form Factors in Light-cone pQCD |
| *Day, Date & Time* | : | Wednesday, January 27, 2010<br>at 11:00 a.m. |
| *Place* | : | Theoretical Physics<br>Seminar Room (A304) |


*Abstract*

We analyze the electromagnetic pion and kaon form factors by including soft and higher-twist effects within the framework of resummed perturbative QCD (pQCD) for both the space and time-like regions. We focus on the transition from the perturbative to non-perturbative behavior in the phenomenological intermediate energy regime. Using a modified "kT" factorization scheme with transverse degrees of freedom, we evaluate the non-perturbative soft contributions as distinct from the hard contributions, ensuring no double counting via the vector Ward Identity at $Q^2 = 0$. The soft contributions are obtained via local quark-hadron duality while the hard contributions rest on the well known factorization ansatz with intrinsic transverse momentum dependence of the distribution amplitudes modeled via the Brodsky-Huang-Lepage ansatz. Our analysis shows that while the perturbative twist-2 hard part prevails for large $Q^2$ beyond 50-100 GeV$^2$ or so, for low and moderate momentum transfers, say, below 10 GeV$^2$, the soft contributions dominate in the space-like region and the twist-3 contributions dominate in the time-like region. Thus, we demonstrate the importance of including the genuine non-perturbative soft and power suppressed twist-3 contributions for simultaneously explaining the space- and time-like experimental form factor data to a reasonable good accuracy.


*(Nilmani Mathur)*