1119-13-153 **Youngsu Kim*** (youngsu.kim@ucr.edu), 900 Univ. Ave., Riverside, CA 92521, and **Vivek Mukundan** (vmukunda@purdue.edu), 150 N Univ St, West Lafayette, IN 47907. *Defining ideals of special fiber rings and birational morphisms of projective spaces.*

In algebraic geometry, it is interesting and important to study if a given morphism is birational. Consider a morphism $\phi : \mathbb{P}_k^{n-1} \xrightarrow{[f_0:\cdots:f_n]} \mathbb{P}_k^n$, where k is a field. In this talk, we study a characterization of ϕ being birational to its image. From algebraic perspective, this corresponds to studying the field of fractions of two rings: Let $R = k[x_1, \ldots, x_n]$ be the coordinate ring of $\mathbb{P}_k^{n-1}$ and $I = (f_0, \ldots, f_n)$. The graph of ϕ is the Rees algebra $R[It]$, and the image of ϕ is the special fiber ring $\mathcal{F}(I) := R[It] \otimes_R R/\mathfrak{m}$, where $\mathfrak{m} = (x_1, \ldots, x_n)R$. Then ϕ is birational iff $k[f_0, \ldots, f_n] \subseteq k[x_1, \ldots, x_n]$ have the same field of fractions.

When I is height 2 perfect ideal satisfying $\mu(IR_p) \leq \dim R_p$ for all $p \in \operatorname{Spec} R - \mathfrak{m}$ (here, $\mu(-)$ denotes the minimal number of generators), we will present a characterization of the morphism ϕ being birational in terms of a differential map of a free resolution of the symmetric algebra of I. Our criteria is obtained by studying the degrees of the defining ideal of the special fiber ring $\mathcal{F}(I)$. (Received February 16, 2016)