999-13-199          **Liana M Sega\*** (`lsega@math.msu.edu`) and **Christel Rotthaus** (`rotthaus@math.msu.edu`).
*Open loci of graded modules.*

Let $A = \oplus_{i \in \mathbb{N}} A_i$ be an excellent homogeneous Noetherian graded ring and let $M = \oplus_{n \in \mathbb{Z}} M_n$ be a finitely generated graded $A$-module. We consider $M$ as a module over $A_0$ and show that the $(S_k)$-loci of $M$ are open in $\mathrm{Spec}(A_0)$. In particular, the Cohen-Macaulay locus $U_{CM}^0 = \{p \in \mathrm{Spec}(A_0) \mid M_p$ is Cohen-Macaulay$\}$ is an open subset of $\mathrm{Spec}(A_0)$. We also show that the $(S_k)$-loci on the homogeneous parts $M_n$ of $M$ are eventually stable. As an application we obtain that for a finitely generated Cohen-Macaulay module $M$ over an excellent ring $A$ and for an ideal $I \subseteq A$ which is not contained in any minimal prime of $M$ the $(S_k)$-loci for the modules $M/I^n M$ are eventually stable. (Received August 23, 2004)