## Graph-Skein Modules of Three-Manifolds <br> Nafaa Chbili, Tokyo Institute of Technology

Let $\mathcal{R}=\mathbb{Z}\left[A^{ \pm 1}, \delta^{-1}\right]$, where $\delta=-A^{2}-A^{-2}$. Let $M$ be a three-manifold and let $\mathcal{G}$ be the set of all isotopy classes of ribbon graphs embedded in $M$. We define the Yamada skein module of $M$ as the quotient of the free module $\mathcal{R}[\mathcal{G}]$ by the skein relations introduced by S . Yamada to define the topological invariant of spatial graphs known as the Yamada polynomial. We compute this module for Handelbodies and explore its relationship with the Kauffman bracket skein module.

