The canonical decomposition of dimension vectors of quivers - an algorithm by Weyman and Derksen

Abstract:
Kac introduced the term of canonical decomposition of a dimension vector of a quiver. In 1990 Schofield presented an algorithm to compute this canonical decomposition, but it needed to compute recursively all extension groups of smaller degree. In 2002 Weyman and Derksen published another algorithm, based on the definition of the so called 'compartment'.
In this talk, we will establish certain conditions for the canonical decomposition on which the algorithm is based. We will work with the Zariski topology on the set of representations $\mathrm{Rep}_Q(\alpha)$ of a fixed dimensions vector α and use the upper-semicontinuity of the maps sending two representations V, W to its Hom – or Ext-space, respectively. Thus, we can easily work with their generic values, which we will denote by $\hom(\alpha, \beta)$ and $\mathrm{ext}(\alpha, \beta)$. Besides of the definition 'compartment', we will also need the definition of 'left orthogonality'. Those two definitions and the main result of Kac on this topic play an important role to deduce five conditions on which the algorithm by Weyman and Derksen is based.