MARK KLEINER, Syracuse University

Integrations and functor Ext

Let Λ be a finite dimensional algebra over a field K. If M and N are left Λ-modules, an *integration* of M into N is a K-linear map $f : \Lambda \underset{K}{\otimes} M \to N$ for which $f(\lambda_1\lambda_2 \otimes x) = \lambda_1 f(\lambda_2 \otimes x) + f(\lambda_1 \otimes \lambda_2 x)$. The reason for the name "integration" is that if one writes $\int \left(\int x\,dt\right)\,d\lambda$ for $f(\lambda \otimes x)$ and assumes that $\lambda_1, \lambda_2,$ and x are functions of the independent variable $t,$ the above equation turns into the following valid formula from integral calculus:

$$\int \left(\int x\,dt\right)\,d(\lambda_1\lambda_2) = \lambda_1 \int \left(\int x\,dt\right)\,d\lambda_2 + \int \left(\int \lambda_2 x\,dt\right)\,d\lambda_1.$$

Integrations give an alternative, simpler approach to the computation of the group $\mathrm{Ext}^1_\Lambda(M,N)$ and shed new light on almost split sequences. The notion of integration is inspired by the theory of bocses.