1110-05-296   **Rafael S. González D'León*** (`rafaeldleon@uky.edu`), University of Kentucky, Lexington, KY.
On the free Lie algebra with multiple brackets.

It is a classical result that the multilinear component of the free Lie algebra is isomorphic (as a representation of the symmetric group) to the top (co)homology of the proper part of the poset of partitions Π_n tensored with the sign representation. We generalize this result in order to study the multilinear component of the free Lie algebra with multiple compatible Lie brackets. We introduce a new poset of weighted partitions Π_n^k that allows us to generalize the result. The new poset is a generalization of Π_n and of the poset of weighted partitions Π_n^w introduced by Dotsenko and Khoroshkin and studied by the author and Wachs for the case of two compatible brackets. We prove that the poset Π_n^k with a top element added is EL-shellable and hence Cohen-Macaulay. This and other properties of Π_n^k enable us to answer questions posed by Liu on free multibracketed Lie algebras. (Received February 23, 2015)