Hochschild polytopes

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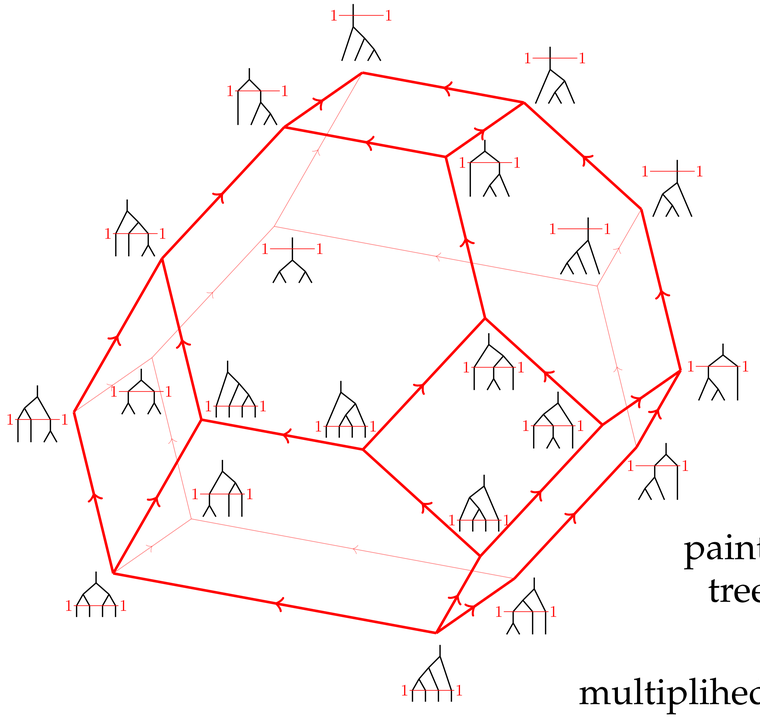
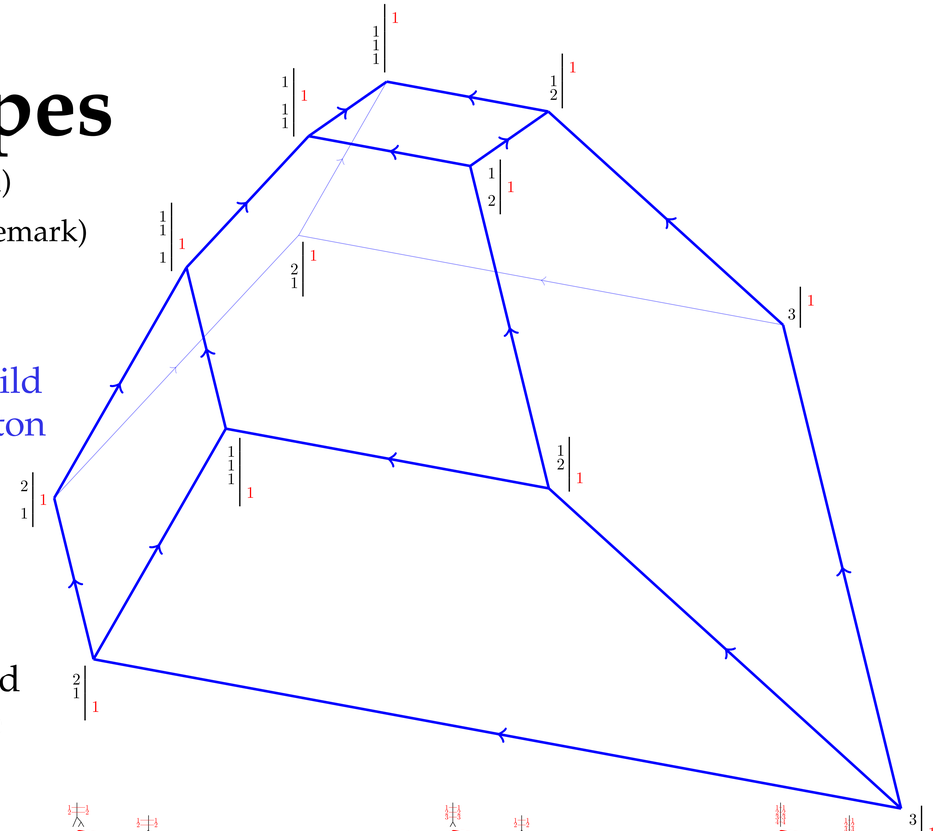


Thm. The Hasse diagram of the Hochschild lattice is isomorphic to the oriented skeleton of a deformed permutahedron.



painted trees —shadow map (meet semilattice morphism)→ lighted shades

multiplihedron —deleting inequalities in facet description→ Hochschild polytope

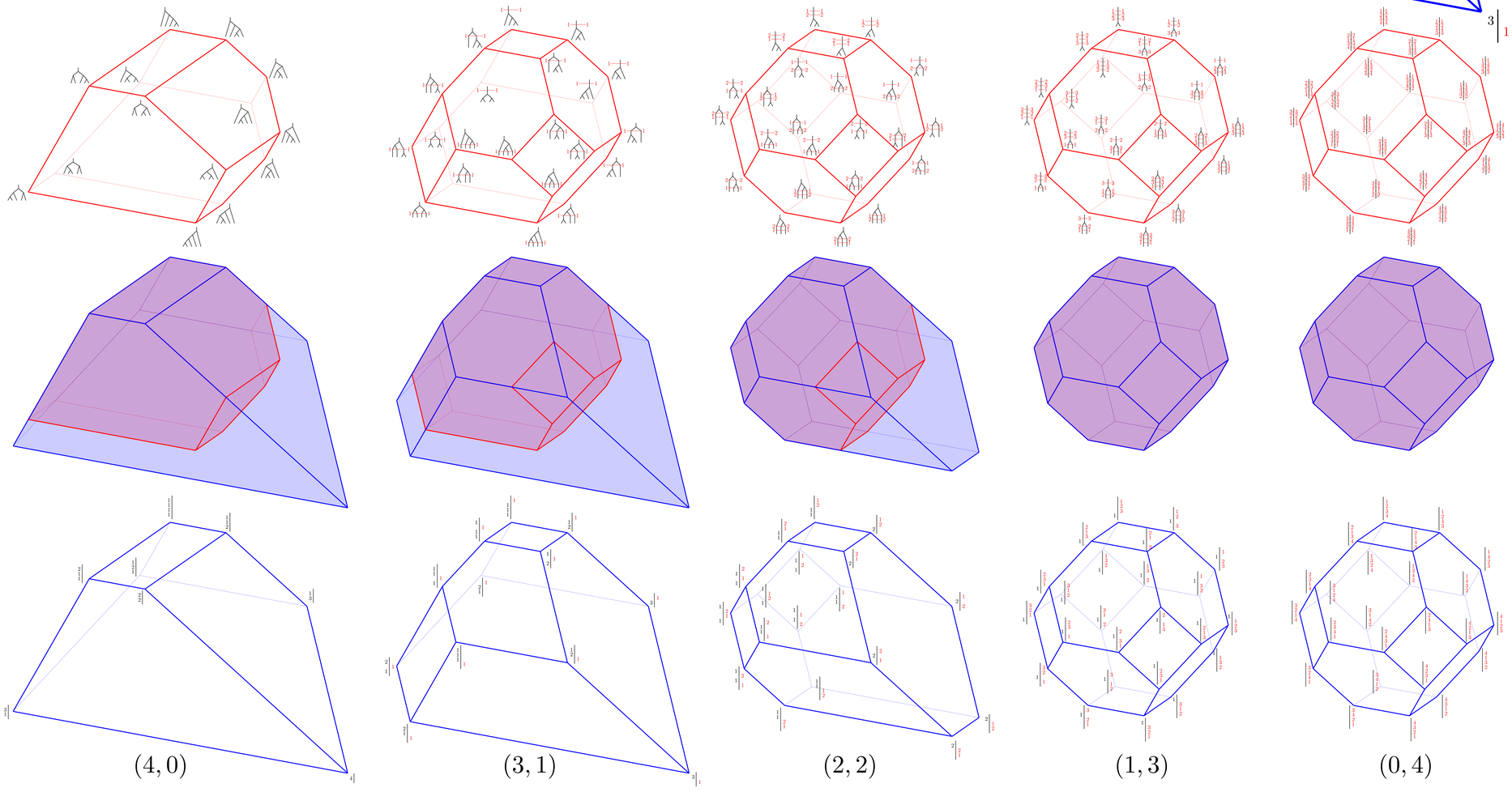
m-painted n-tree lattice &
(m,n)-multiplihedron

$= \mathrm{shuffle}(\mathbb{P}\mathrm{erm}(m), \mathbb{A}\mathrm{sso}(n))$
$= \mathbb{P}\mathrm{erm}(m) \times \mathbb{A}\mathrm{sso}(n) + \sum_{i\in[m],j\in[n]} [\mathbf{e}_i, \mathbf{e}_{m+j}]$

shadow map
recall arities of subtrees along the rightmost branch
↓ meet semilattice morphism

m-lighted n-shade lattice &
(m,n)-Hochschild polytope

obtained by deleting facets from the (m,n)-multiplihedron



$(m,n) =$ $(4,0)$ $(3,1)$ $(2,2)$ $(1,3)$ $(0,4)$