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Supports of weight modules over Witt algebras

So far there is no classification for simple weight modules with finite dimensional weight spaces over Witt algebras W_n (or W_n^+). In this talk, we will explicitly describe supports of such modules over W_n . We also give some descriptions on the support of an arbitrary simple weight module over a \mathbb{Z}^n -graded Lie algebra \mathfrak{g} having a root space decomposition $\bigoplus_{\alpha \in \mathbb{Z}^n} \mathfrak{g}_\alpha$ with respect to the abelian subalgebra \mathfrak{g}_0 , with the property $[\mathfrak{g}_\alpha, \mathfrak{g}_\beta] = \mathfrak{g}_{\alpha+\beta}$ for all $\alpha, \beta \in \mathbb{Z}^n$, $\alpha \neq \beta$ (this class contains the algebras W_n).

This talk is based on a joint work (arXiv:0906.0947) with V. Marzuchuk.