Bode, Andreas
Completed tensor products and a global approach to $p$-adic analytic differential operators. (English) Zbl 1441.14084
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Summary: K. Ardakov and S. J. Wadsley [J. Reine Angew. Math. 747, 221–275 (2019; Zbl 1439.14064)] defined the sheaf $\hat{\mathcal{D}}_X$ of $p$-adic analytic differential operators on a smooth rigid analytic variety by restricting to the case where $X$ is affinoid and the tangent sheaf admits a smooth Lie lattice. We generalise their results by dropping the assumption of a smooth Lie lattice throughout, which allows us to describe the sections of $\hat{\mathcal{D}}$ for arbitrary affinoid subdomains and not just on a suitable base of the topology. The structural results concerning $\hat{\mathcal{D}}$ and coadmissible $\hat{\mathcal{D}}$-modules can then be generalised in a natural way.

The main ingredient for our proofs is a study of completed tensor products over normed $K$-algebras, for $K$ a discretely valued field of mixed characteristic. Given a normed right module $U$ over a normed $K$-algebra $A$, we provide several exactness criteria for the functor $U \hat{\otimes} A$ – applied to complexes of strict morphisms, including a necessary and sufficient condition in the case of short exact sequences.

MSC:
14G22 Rigid analytic geometry
14G35 Modular and Shimura varieties
14F10 Differentials and other special sheaves; $D$-modules; Bernstein-Sato ideals and polynomials
16S38 Rings arising from noncommutative algebraic geometry
22E50 Representations of Lie and linear algebraic groups over local fields

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