NONARCHIMEDEAN MODELS OF O-MINIMAL EXPANSIONS OF $(\mathbb{R}, +, \cdot, <)$

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Topic #2: *Nonstandard Methods in Algebra, Algebraic Geometry and Topology*

[Joint work with Saharon Shelah.[1]]

In [K–K–S] it was shown that fields of generalized power series cannot admit an exponential function. In this talk, we present the main result of [K–S]: we construct fields of generalized power series with *bounded support* which admit an exponential. We give a natural definition of an exponential, which makes these fields into models of real exponentiation. The method allows to construct for every κ regular uncountable cardinal, 2^{κ} pairwise non-isomorphic models of real exponentiation (of cardinality κ), but all isomorphic as ordered fields. Indeed, the 2^{κ} exponentials constructed have pairwise distinct *growth rates*. This method relies on constructing lexicographic chains with many automorphisms. At the end of the talk, we shall consider the problem of introducing derivation operators on these models. The aim is to present a new class of ordered differential fields, with many interesting properties.

References:

[K–K–S] Kuhlmann, F.-V. – Kuhlmann, S. – Shelah, S. : *Exponentiation in power series fields*, Proc. Amer. Math. Soc. **125** (1997), 3177-3183.

[K–S] Kuhlmann, S. – Shelah, S. : *κ–bounded Exponential-Logarithmic power series fields*, Annals for Pure and Applied Logic **136**, 284-296, (2005).

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