▸ MARCOS MAZARI-ARMIDA, *Limit models and universal torsion-free groups with pure embeddings.*
Department of Mathematical Sciences, Carnegie Mellon University, 5000 Forbes Ave, USA.
E-mail: mmazaria@andrew.cmu.edu.

The notion of limit model was introduced by Shelah 25 years ago as a substitute for saturation in the context of AECs. Limit models have proven to be an important concept in tackling Shelah's eventual categoricity conjecture. The key question has been the uniqueness of limit models of the same cardinality. Despite the importance of limit models in the understanding of AECs, explicit examples have never been studied.

In this talk, we will present a characterization of limit models in the class of torsion-free abelian groups with the pure subgroup relation.

THEOREM 1. *If G is a limit model of cardinality λ in the class of torsion-free abelian groups with the pure subgroup relation, then:*

- *If the length of the chain has uncountable cofinality, then $G \cong \mathbb{Q}^{(\lambda)} \oplus \Pi_p \overline{\mathbb{Z}_{(p)}^{(\lambda)}}$.*
- *If the length of the chain has countable cofinality, then $G \cong \mathbb{Q}^{(\lambda)} \oplus \Pi_p \overline{\mathbb{Z}_{(p)}^{(\lambda)}}^{(\aleph_0)}$.*

In particular, the class does not have uniqueness of limit models for any infinite cardinal.

As a by-product of the study of limit models, we get a conceptual generalization to a highly computational result of Shelah [3, 1.2] concerning the existence of universal reduced torsion-free abelian groups with respect to pure embeddings.

Finally, we will show how this results can be extended to certain classes of modules axiomatizable in first-order logic.

This talk is based on [2] and a joint paper with T. Kucera [1].

[1] THOMAS G. KUCERA AND MARCOS MAZARI-ARMIDA, *A note on universal modules with pure embeddings* , in preparation.

[2] MARCOS MAZARI-ARMIDA, *Algebraic description of limit models in classes of abelian groups*, ***preprint***, https://arxiv.org/abs/1810.02203.

[3] SAHARON SHELAH, *Universal Structures*, ***Notre Dame Journal of Formal Logic***, vol. 58 (2017), pp. 159–177.