

# Atom canonicity, complete representations and omitting types

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## Abstract

In this talk I will present the main concepts and key ideas in a large research project, that is very much alive, relating three distinct facets of the same phenomena.

(a) The notion of atom-canonicity in Boolean algebras with operators, a well-known persistence property in modal logic,

(b) The semantical notion of complete representations in algebras of relations (that are special Boolean algebras with operators) such as Tarski's cylindric and relation algebras

(c) The omitting types theorem formulated appropriately to adapt to several multi-modal logics.

The talk is self-contained with all necessary definitions given. Full proofs are available upon request. Parts of the presented work is joint with Hajnal Andréka, Istvan Németi and Robin Hirsch.<sup>1</sup>

Relevant references:

1. T. Sayed Ahmed, *Omitting types for algebraizable extensions of first order logic*. Journal of Applied non-classical logics **15** (4) (2006), p.465-487.
2. T. Sayed Ahmed, T. *Omitting types for first order logic with infinitary predicates* Mathematical Logic Quarterly **53**(6) (2007) p.564-576. pdf
3. T. Sayed Ahmed, *Weakly representable atom structures that are not strongly representable, with an application to first order logic*. Mathematical Logic Quarterly, **54**(3)(2008) pp. 294–306
4. T. Sayed Ahmed *The class of completely representable polyadic algebras of infinite dimensions is elementary* Algebra universalis **72**(1) (2014), pp. 371–390.
5. Tarek Sayed Ahmed. *Existence of Certain Finite Relation Algebras Implies Failure of Omitting Types for  $L_n$* . Notre Dame J. Formal Logic **61** (4) pp. (2020) 503 - 519.
6. T.Sayed Ahmed, H. Andréka, and I. Németi *Omitting types for finite variable fragments and complete representations of algebras*. Journal of Symbolic Logic **73**(1) (2008) p.65-89.
7. T. Sayed Ahmed and Robin Hirsch *The neat embedding theorem for cylindric like algebras and for infinite dimensions* Journal of Symbolic Logic **79**(1) (2014) pp. 208–222.

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<sup>1</sup>Keywords: Omitting types, multi-modal logic, clique-guarded fragments, atom-canonicity, cylindric algebras, Mathematics subject classification: 03B45, 03C07, 03C10, 03G15, 05C15.