

## Logic Seminar

### *A Tale of Two Liouville Closures*

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**Abstract:** H-fields are ordered differential fields which serve as an abstract generalization of both Hardy fields (ordered differential fields of germs of real-valued functions at  $+\infty$ ) and transseries (ordered valued differential fields such as  $\mathbb{T}$  and  $\mathbb{T}_{\log}$ ). A *Liouville closure* of an H-field  $K$  is a minimal real-closed H-field extension of  $K$  that is closed under integration and exponential integration. In 2002, Lou van den Dries and Matthias Aschenbrenner proved that every H-field  $K$  has exactly one, or exactly two, Liouville closures, up to isomorphism over  $K$ . Recently (in [arxiv.org/abs/1608.00997](https://arxiv.org/abs/1608.00997)), I was able to determine the precise dividing line of this dichotomy. It involves a technical property of H-fields called  $\lambda$ -freeness. In this talk, I will review the 2002 result of van den Dries and Aschenbrenner and discuss my recent contribution.

Tuesday, February 28 at 4:00 PM in SEO 427