

# SEMINÁRIO

## LÓGICA MATEMÁTICA

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### Proof mining and asymptotic regularity

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#### ABSTRACT:

Proof mining is a subfield of applied proof theory concerned with the extraction, with the help of proof-theoretic tools, of new quantitative and qualitative information from mathematical proofs. This paradigm of research, developed by Ulrich Kohlenbach beginning with the 1990s, is inspired by Kreisel's program on unwinding of proofs from the 1950s.

Asymptotic regularity is a very important property in nonlinear analysis and optimization, introduced in the 1960s by Browder and Petryshyn for the Picard iteration and extended to general iterations by Borwein, Reich, and Shafrir in 1992. In numerous proofs of the strong or weak convergence of a nonlinear iteration, one obtains as an intermediate step the asymptotic regularity of the iteration, usually in a very general setting.

In this talk we present recent applications of proof mining providing effective uniform rates of asymptotic regularity for different iterations in optimization and nonlinear analysis.

This is joint work with Paulo Firmينو and Horatiu Cheval.