

INCOMPLETENESS AND INTENSIONALITY VIA UNIVERSAL PROPERTY OF ARITHMETIC

LINGYUAN YE

ABSTRACT. This talk proposes an approach towards understanding incompleteness phenomena from the perspective of categorical logic. The upshot is that incompleteness theorems of arithmetic are *canonical* consequences of, as the title suggests, *universal properties* of various arithmetic theories. From a technical point of view, this approach promises a completely categorical proof of incompleteness, without needing the tedious syntactic details of the arithmetisation process, which usually depends on too many arbitrary choices. Philosophically, the universal property also demystify a lot of *intensional* claims often exhibited in either the proof or the statement of incompleteness results in logic — they actually have numerous “counterexamples”, including the second incompleteness theorems, if not stated carefully enough. This is yet another great example of categorical method providing both technically and philosophically more satisfying answers to foundational aspects of logic itself.

UNIVERSITY OF CAMBRIDGE
Email address: ly386@cam.ac.uk

Date: September 11, 2024.

Key words and phrases. Arithmetic, Incompleteness, Intensionality, Categorical Logic.