

# Modern Type Theories and Their Applications

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This talk consists of two parts. In Part I, I'll introduce *modern type theories*, as studied by Martin-Löf and others [6, 2, 3, 5], briefly discussing their historical development, meaning-theoretic and meta-theoretic studies and employment in proof technology. Then, in Part II, I'll give an overview of the following two applications of type theory:

- Natural language semantics in modern type theories (*MTT-semantics* for short) [9, 4, 1]. Thanks to its recent development [1, 5], MTT-semantics has become a full-blown alternative to the traditional formal semantics (Montague semantics [7]), with attractive features and a promising future.
- *Univalent foundations* of mathematics, as proposed by Voevodsky [10] and studied formally in homotopy type theory [8]. The new framework provides a fresh look at foundational issues, covering both traditional set-theoretical mathematics and new higher-dimensional mathematics and providing a good basis for computer-assisted proof development.

If time permits, I'll also discuss some ongoing research topics in both of the above fields, albeit only briefly.

## References

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