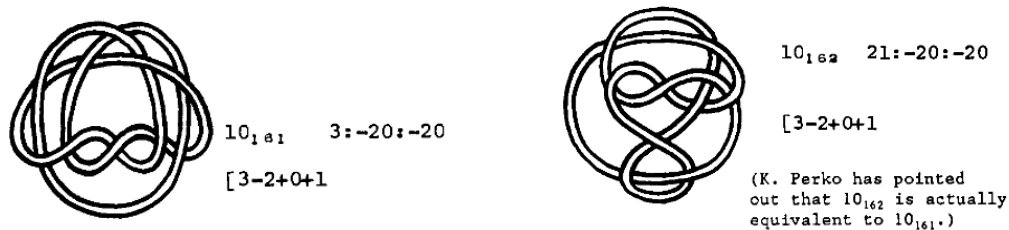# Minicourse on knot theory and geometry

Abstract.

For at least 73 years the Perko Pair was listed as two distinct knots in tables. But they are the same!

Structure.   Two hour-long lectures per week for the four weeks of July.

Content.   W1: Classical knot theory. The problem of distinguishing knots. Elementary topological invariants. Some fun tricks.

W2: Geometric knot theory. Hyperbolic knots. Perhaps some arithmetic knots.

W3: Braids. 2-bridge knots (inc. computation of matrix representations for fundamental group). Relation to mapping class groups.

W4: Knot polynomials. Alexander. Conway. Jones. HOMFLY–PT.

Expected preparation.   Basic topology (what is π_1). Passing familiarity with classical hyperbolic geometry in 2 or 3 dimensions.

Books.   Lecture notes will be provided. In addition:

- Gerhard Burde, Heiner Zieschang, and Michael Heusener. *Knots* (3e). De Gruyter (2014).

- Louis H. Kauffman. *On knots*. Princeton (1987).

- W. B. Raymond Lickorish. *An introduction to knot theory*. Springer (1997).

- Jessica Purcell. *Hyperbolic knot theory*. AMS (2021).