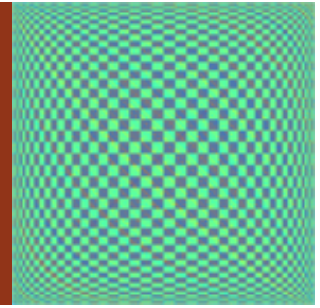




Centro de Matemática  
Universidade do Porto



## Seminar on Semigroups, Automata and Languages

### The geometry of Schutzenberger graphs and subgroups of special inverse monoids

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**Abstract:** An inverse monoid is called special if it is defined by a presentation where all the defining relations are of the form  $w = 1$ . There is strong motivation for studying this class coming from results of Ivanov, Margolis and Meakin (2001) who showed that if all special one-relator inverse monoids with defining relator  $w = 1$ , where  $w$  is a reduced word, have decidable word problem then this would answer positively the open problem of whether all one-relation monoids have decidable word problem. Further motivation comes from the fact that the corresponding class of special monoids has a very well-developed and successful theory which has its roots in classical results of Adjan and Makanin from the 1960s. Among other things their results show that the group of units of a finitely presented  $k$ -relator special monoid is a finitely presented  $k$ -relator group, and the word problem for the monoid is decidable if and only if it is decidable in its group of units.

Ivanov, Margolis and Meakin (2001) proved that the group of units of a finitely presented special inverse monoid is finitely generated. In recent joint work with Ruskuc (2021) we showed that, in contrast to special monoids, there is a finitely presented special inverse monoid whose group of units is not finitely presented. This left open the question of determining exactly which groups can arise as the group of units of a finitely presented special inverse monoid.

In this talk I will present some recent joint work which Mark Kambites (Manchester) which gives a complete answer to this question, and in addition gives a description of exactly which groups can arise as maximal subgroups of finitely presented special inverse monoids. I will also indicate how we established these results by developing new geometric approaches to maximal subgroups, exploiting the fact that they are isomorphic to automorphism groups of Schutzenberger graphs.

**Date:** Friday, 25 November 2022, 14:30

**Place:** Online Zoom meeting



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