POSTERS

- Nested Artin Approximation with two nests **by Gregor Böhm**.

  Assume given an algebraic system of equations $f(x, y) = 0$ in two sets of multi-variables x and y. Let be given a formal power series vector $y(x)$ in the x-variables, which solves the system.

  The classical Artin approximation theorem states that $y(x)$ can be approximated by algebraic power series solutions up to arbitrarily high degree.

  The question then is : if $y(x)$ is nested, i.e., its components depend only on nested sets of variables, can the same be achieved for the approximating algebraic power series ? This is known to be true by Popescu's nested approximation theorem. However, the proof uses heavy machinery and is difficult to follow. In our poster we will present a simple and elementary proof of this result for the special case of only two nests, the smaller nest involving only a single variable. We follow the strategy proposed by Denef and Lipshitz to solve first for the components of $y(x)$ with larger nest. In this way one is able to reduce the problem in a tricky way to the case of a single variable. Now, the classical theorem of Greenberg applies and yields the result.

- On the problem of computing intersections of fields **by Manfred Buchacher**.

  Given the generators of two fields, and the relations they satisfy, we approach the problem of how to compute their intersection. We present a semi-algorithm that solves the problem when the fields are simple, that is, generated by one element each, and there is only one relation between their generators. It takes as input the relation, and outputs a generator of their intersection. The semi-algorithm may not terminate. Termination depends on a dynamical system on the curve defined by the relation. However, if the intersection is non-trivial, the semi-algorithm is guaranteed to terminate.

- Internality of autonomous algebraic differential equations **by Christine Eagles**.

  Sometimes, solutions to a system of differential equations can be considered as a subset of the constants of some differentially closed field of characteristic zero together with some fixed solutions. When this happens, we say the set of generic solutions is internal to the constants of this field. This poster describes progress, from joint work with Léo Jimenez, on developing an algebraic criterion for when solutions sets are almost internal to the constants.

- Differential subfields of iterated strongly normal extensions **by Partha Kumbhakar**.

  Strongly normal extensions were discovered by Kolchin as a suitable candidate for normal extension of a differential field. They generalizes the differential Galois theory of Picard-Vessiot extensions. In this work, we study differential subfields of iterated strongly normal extensions, particularly differential subfields of strongly normal extensions. The results has two main applications : (i) Describe the differential fields having "no movable singularity" (defined by A. Buium) and the differential subfields "depends rationally on arbitrary constants" (defined by H. Ummemura and K. Nishioka) ; (ii) Determine the differential equations having a generic solution in an iterated strongly normal extensions. We also generalize a result of Rosenlicht to differential equations of arbitrary order. This is a joint work with Varadharaj Ravi Srinivasan.

- Hardy fields and generalized power series **by Nicolas Martinez**.

  The aim of this poster is to highlight some links between two types of mathematical objects : Hardy fields and generalized power series. On the one hand, Hardy fields are differential fields of germs of real functions of a real variable and therefore functional in nature. On the other hand, generalized power series are formal objects. They can be endowed with Hardy-type derivations (Kuhlmann, Matusinski) which emulate the properties of the derivation of a Hardy field. It is conjectured that any Hardy field can be embedded into a field of generalized power series, as ordered, valued and differential fields : this would be a generalization of a theorem of Kaplansky in the case of Hardy fields. A key example is the embedding of the Hardy field associated to the o-minimal structure $\mathbb{R}_{\text{an,exp}}$ into the field of transseries in the sense of Aschenbrenner - van den Dries - van der Hoeven.

- Generalized Iterated Integrals and Stability Problems **by Chitrarekha Sahu**.

  For a differential field F having an algebraically closed field of constants, we analyze the structure of Picard-Vessiot extensions of F whose differential Galois groups are unipotent algebraic groups and apply these results to study stability problems in integration in finite terms and the inverse problem in differential Galois theory for unipotent algebraic groups.