

## Online Number Theory Seminar

17 February 2023. – 17:00-17:50

### Robert Tichy: Diophantine Equation of the Pillai Type: Extensions and Applications

After a short survey on well-known results on Pillai's equation  $a^x - b^y = c$  we present extensions involving linear recurrences  $(U_n)$ . In particular, we show under mild technical conditions that the equation  $U_n - b^m = c$  has at most 2 solutions  $(n, m)$  for  $b > B, n > N_0$  (effectively computable, joint work with Heintze, Vukusic and Ziegler). Furthermore, we consider Pillai's density problem, obtaining asymptotic results for the number of  $c \in [1, x]$  such that  $c = U_n - V_m$  for some  $n, m \in \mathbb{N}$ , (joint work with Vukusic, Yang and Ziegler). Other results are devoted to the so-called Pillai-Tijdeman equation. In the final section of the talk a new application of diophantine number theory to purely algebraic problems is discussed. It is shown that the binomial polynomials are absolutely irreducible in the ring  $\text{Int } \mathbb{Z}$  of integer-valued polynomials over  $\mathbb{Q}$ . This result is due to Rissner and Windisch and involves linear algebra tools as well as results on Pillai type equations and elementary prime number theory.