One way of generalizing the van der Corput sequence as well as the $(n\alpha)$-sequence and some nice encounters

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In the talk we consider two low-discrepancy sequences in the unit interval, the $(n\alpha)$-sequence with special α and the van der Corput sequence in base b. The elements of the first are obtained by taking the fractional part of $n\alpha$ with, e.g., a fixed quadratic irrational α. The second uses the unique base b representation of n with fixed integer $b \geq 2$ and mirrors this representation across the comma. We point out a common property of these two sequences that can be used to derive a low-discrepancy bounds.

Then we introduce (t,s)-sequences in base b and their digital version. Digital (t,s)-sequences are constructed by applying the so-called generating matrices over a finite field. The class of digital sequences contains the van der Corput sequence in a prime base as well as an analog to the $(n\alpha)$-sequence in the field of formal power series over a finite field.

In the class of digital sequences we highlight the Faure sequences because their generating matrices can be expressed in a simple way by using binomial coefficients. This is a nice encounter with objects from combinatorial mathematics when searching for "good" generating matrices.

One aim of this talk is to present two more examples of generating matrices that can be defined by using objects from combinatorial mathematics. The first is based on the Stirling numbers and the second on Catalans numbers.

The first example occurred through cooperations with Gerhard Larcher (JKU Linz) und Isabel Pirsic (Ricam Linz) some years ago during my doctoral studies, the second appeared in spring 2020 where we faced the first Covid19 lockdown in Austria.