Properties and Natural Extensions of p-adic β-shifts

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For a real number $\beta > 1$, the β-shift is a transformation related to the number-theoretic expansion of real numbers in the base β. A similar transformation and expansion exists for the p-adic numbers.

The natural extension is an invertible transformation that contains the dynamics of a noninvertible transformation. Since invertible systems are often easier to work with than noninvertible ones, the natural extension is an important tool in understanding the dynamics of noninvertible transformations such at β-shifts.

This talk will use analogies between maps on the unit interval and maps on the p-adic integers to motivate formulas for the p-adic β-shift and its natural extension. Then we will examine the properties of p-adic β-shifts and more general maps.