Embedding computations in tilings (a perspective of the course)

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Tiling: a mapping $f: \mathbb{Z}^2 \to \tau$ that respects the matching rules

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Remark: for every set of Wang tiles τ the set of all τ -tilings is an SFT

 $\tau\text{-tiling:}$ a mapping $f:\mathbb{Z}^2\to\tau$ that respects the local rules.

au-tiling: a mapping $f: \mathbb{Z}^2 \to au$ that respects the local rules. $T \in \mathbb{Z}^2$ is a **period** if f(x + T) = f(x) for all x.

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other super-classic facts:

- \blacktriangleright in any *reasonable* programming language you can write a program π that prints its own text
- in any reasonable programming language you may assume that your program has an access to its own text
- any effective (polynomial time) real-life algorithm can be performed by a Turing machine in polynomial time

Two techniques

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Very standard application:

a construction of an aperiodic tile set

Less standard application:

aperiodicity + quasiperiodicity

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Very standard application:

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Less standard application:

aperiodicity + quasiperiodicity (and even minimality)

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- ▶ a *minimal* effective shift can be simulated by a *minimal* SFT [?]

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Come to the lectures!