Decagonal Tilings in Medieval Islamic Architecture

Outline

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  - Plane Tilings
  - Regular Tilings
  - Periodic Tilings

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  - Penrose Tilings
  - Girih Tilings

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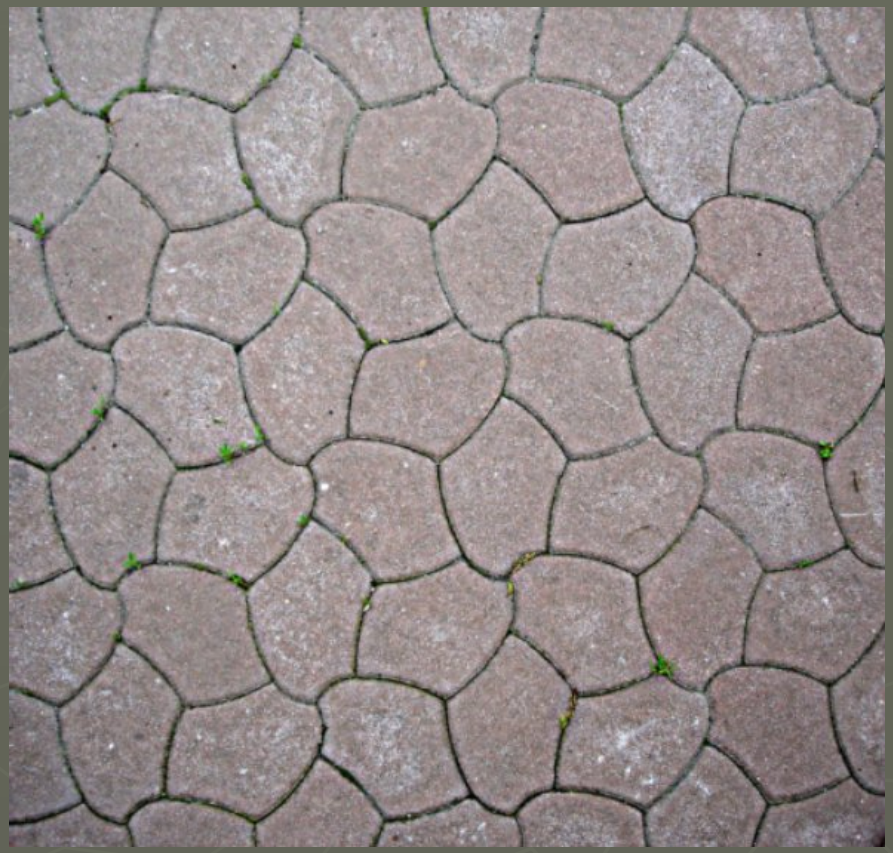

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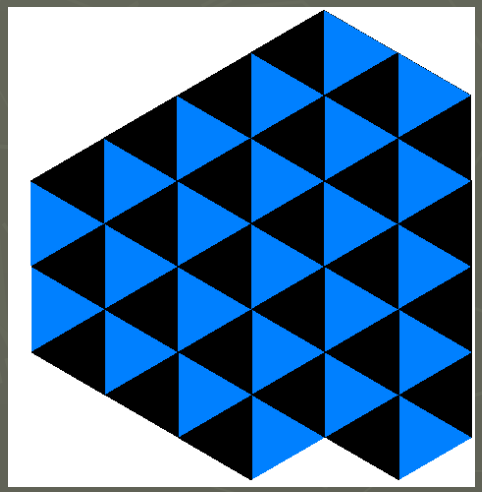

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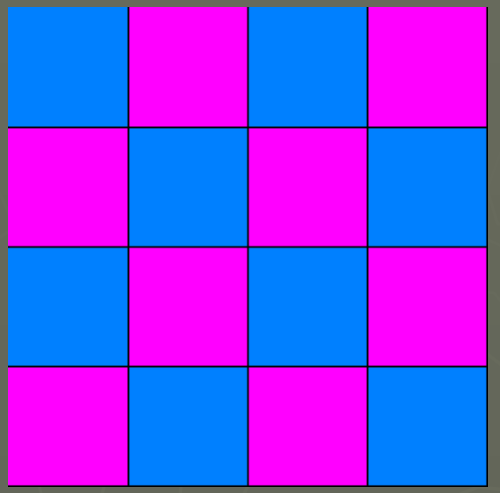

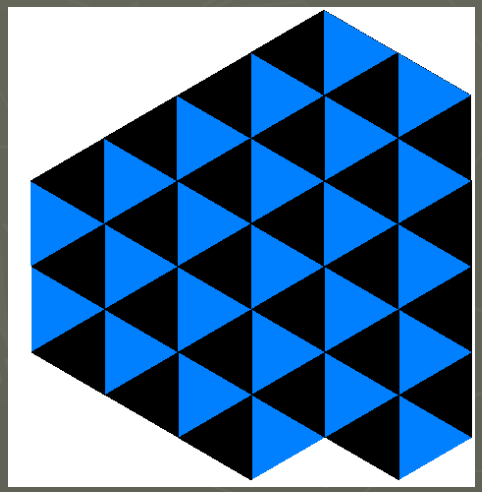

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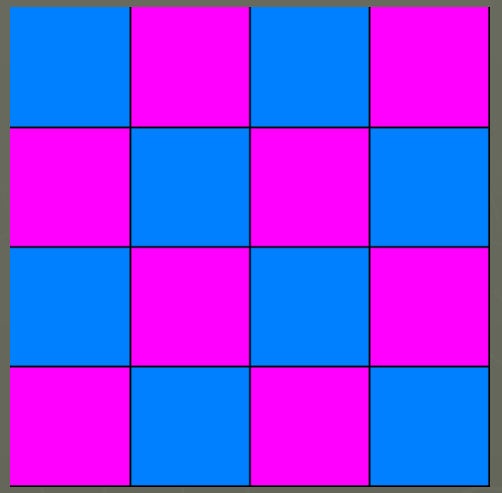

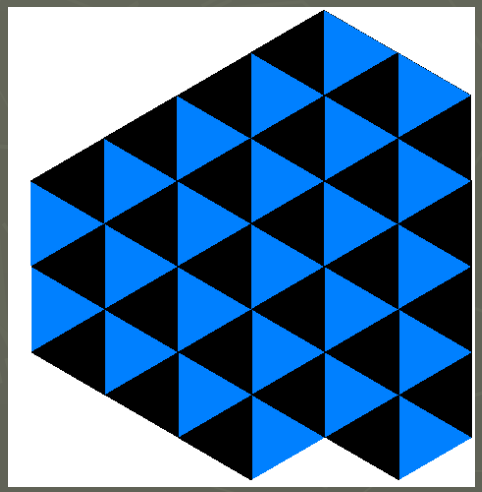

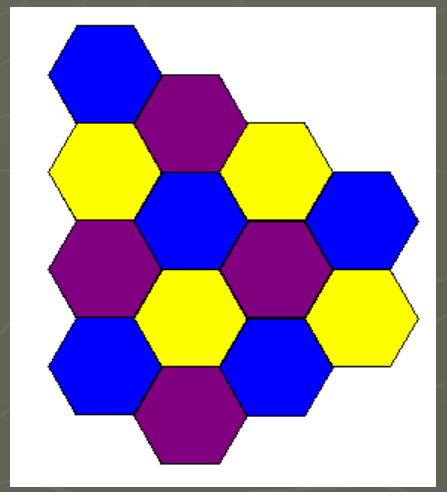

Periodic Tilings

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- Tiling of the plane with translational symmetry

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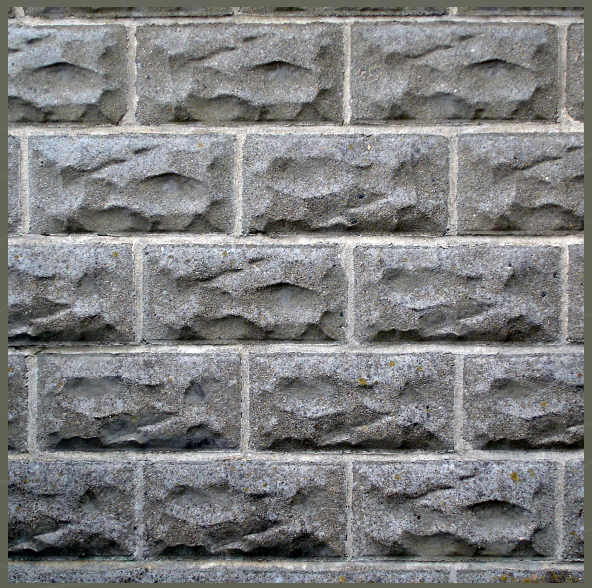

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- Is quasi-periodic (in physics this property is called quasi-crystalline)

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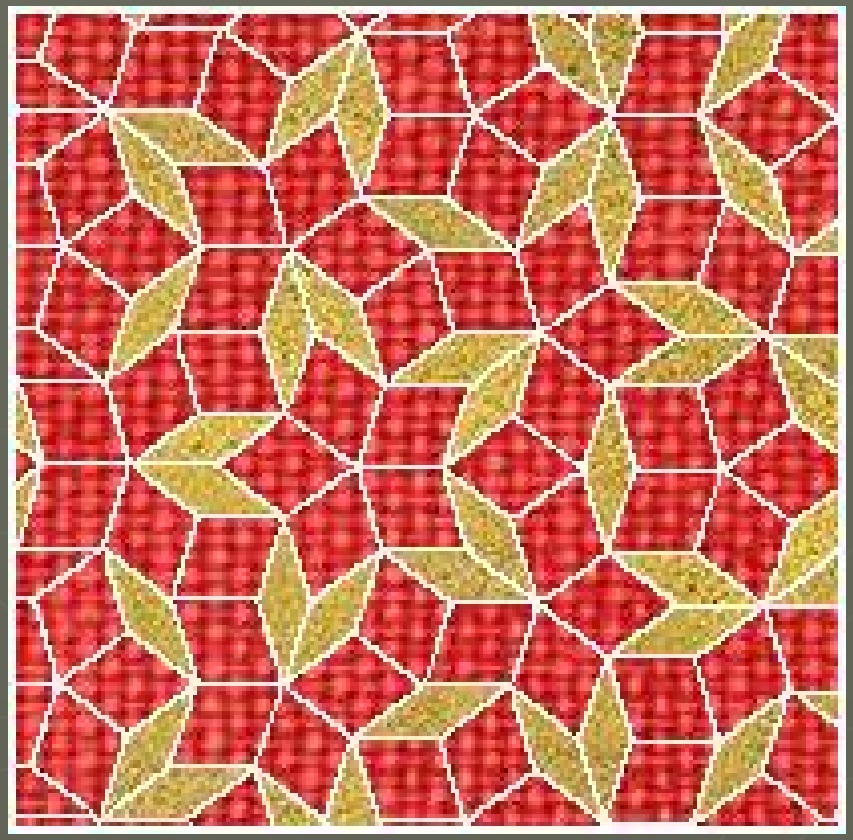
- Ratio between number of each tiles is golden ratio

Penrose Tiling



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- Locally display 10-fold rotational symmetry, and therefore cannot be periodic
- Initially thought to have been created using compass and straight edge method

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- Peter J. Lu at Harvard and Paul J. Steinhardt at Princeton found that Girih Tilings exhibit advanced decagonal quasicrystal geometry like that of Penrose Tilings

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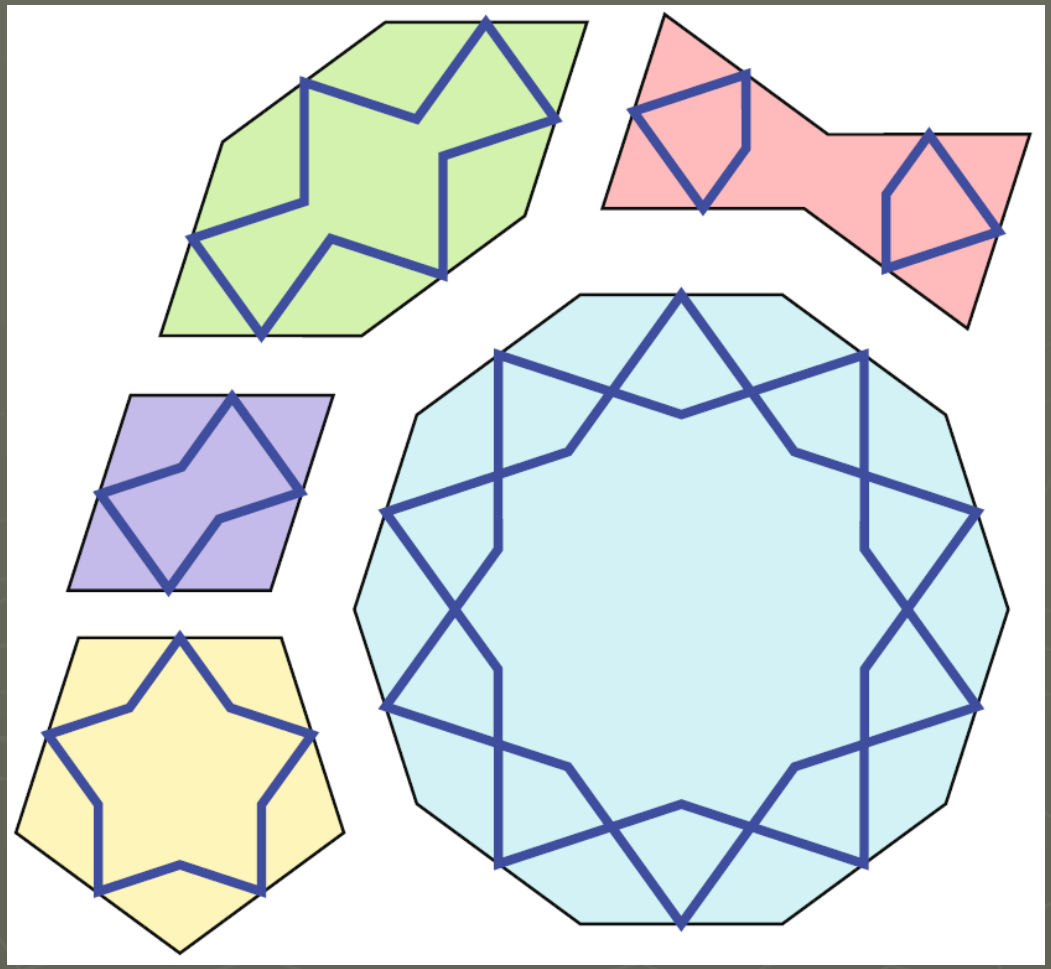
- Girih Tilings used five different tiles
- Can be mapped to Penrose Tilings

Girih Tiling



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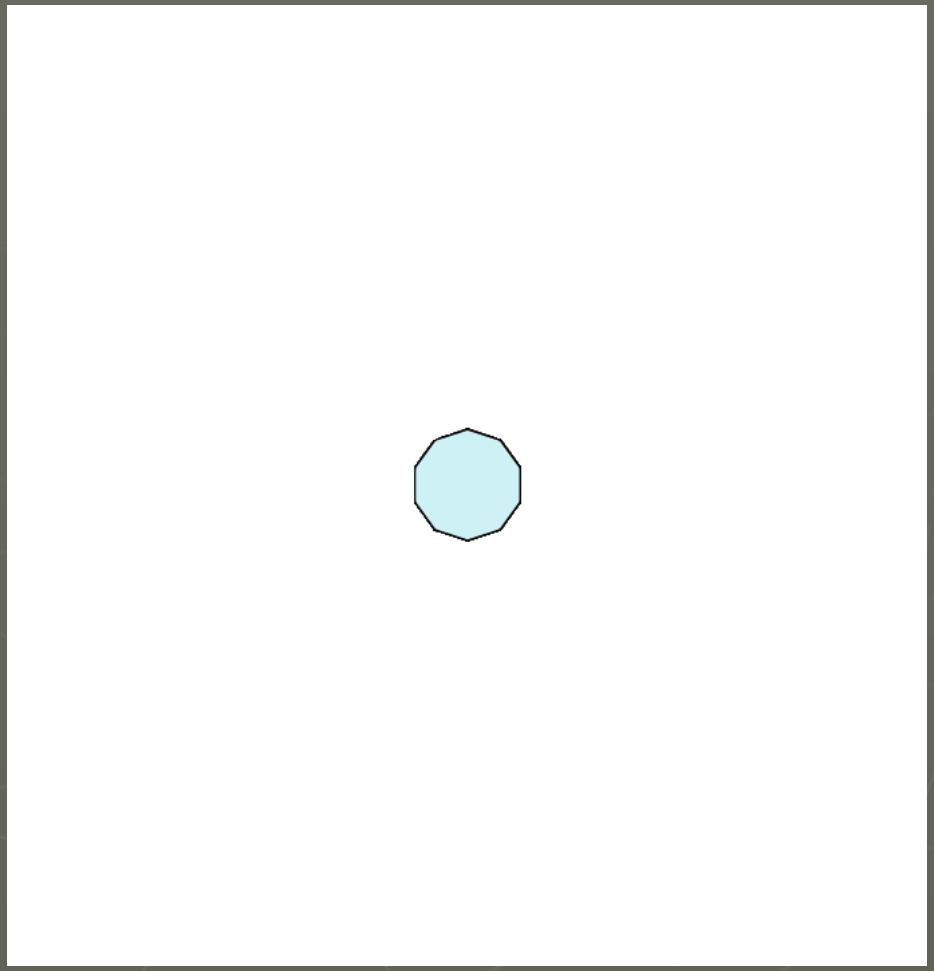

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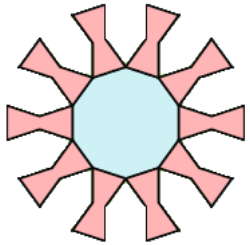

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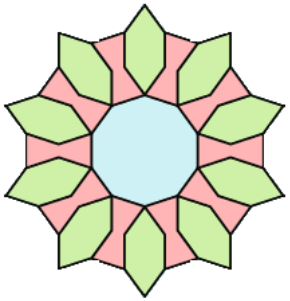

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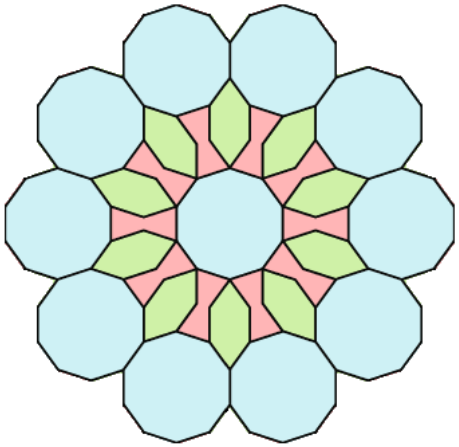

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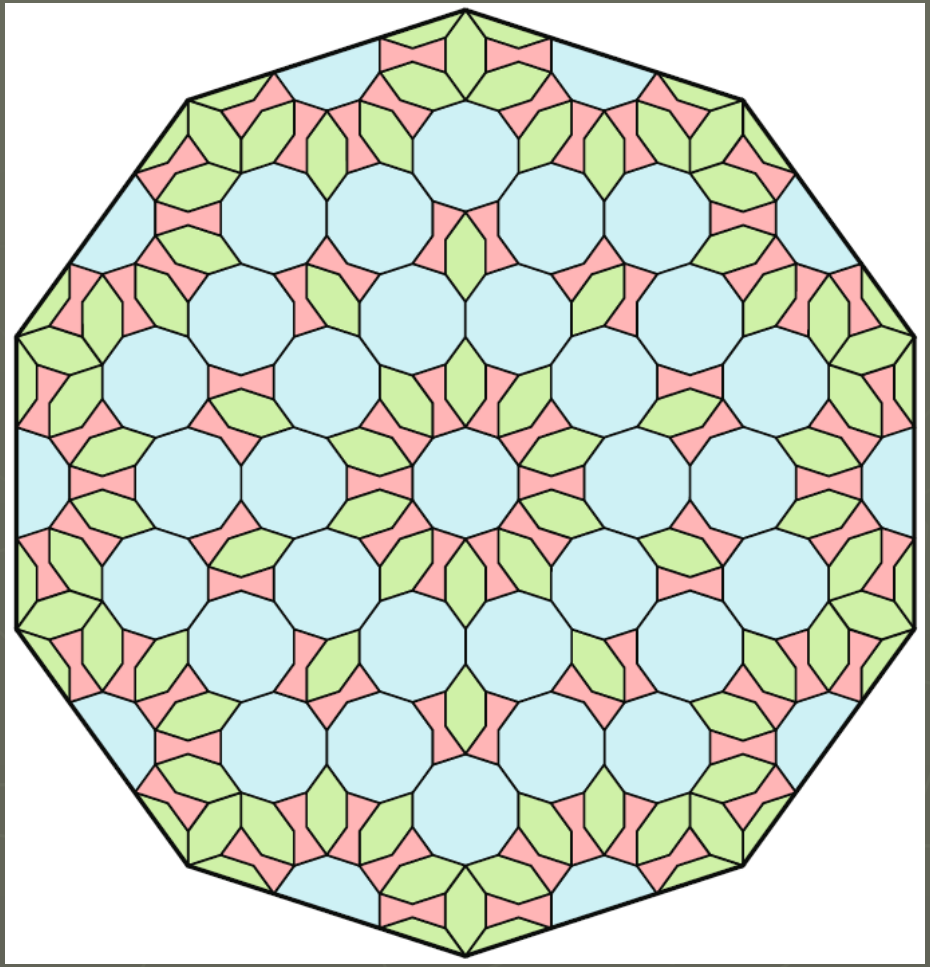

Examples

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References

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2. **Category: Periodic Tiling Image.** Wikipedia.org, http://en.wikipedia.org/wiki/Category:Periodic_tiling_image
3. **Penrose Tilings.** Science U, http://www.scienceu.com/geometry/articles/tiling/penrose.html