

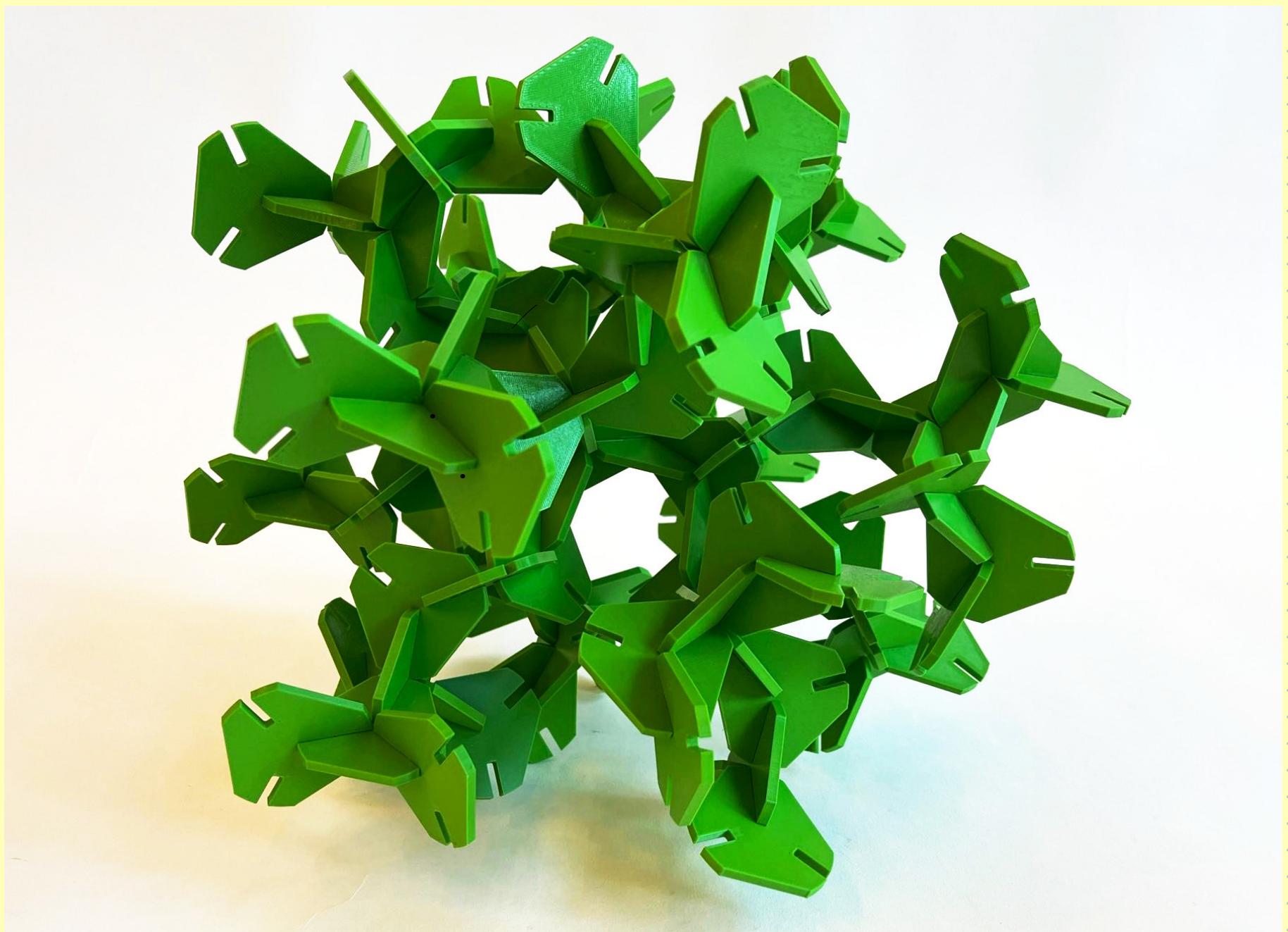
AN APERIODIC MODULAR SCULPTURE

SHINTARO FUSHIDA-HARDY,

JOINT WITH PETER HUXFORD

AN APERIODIC MODULAR SCULPTURE

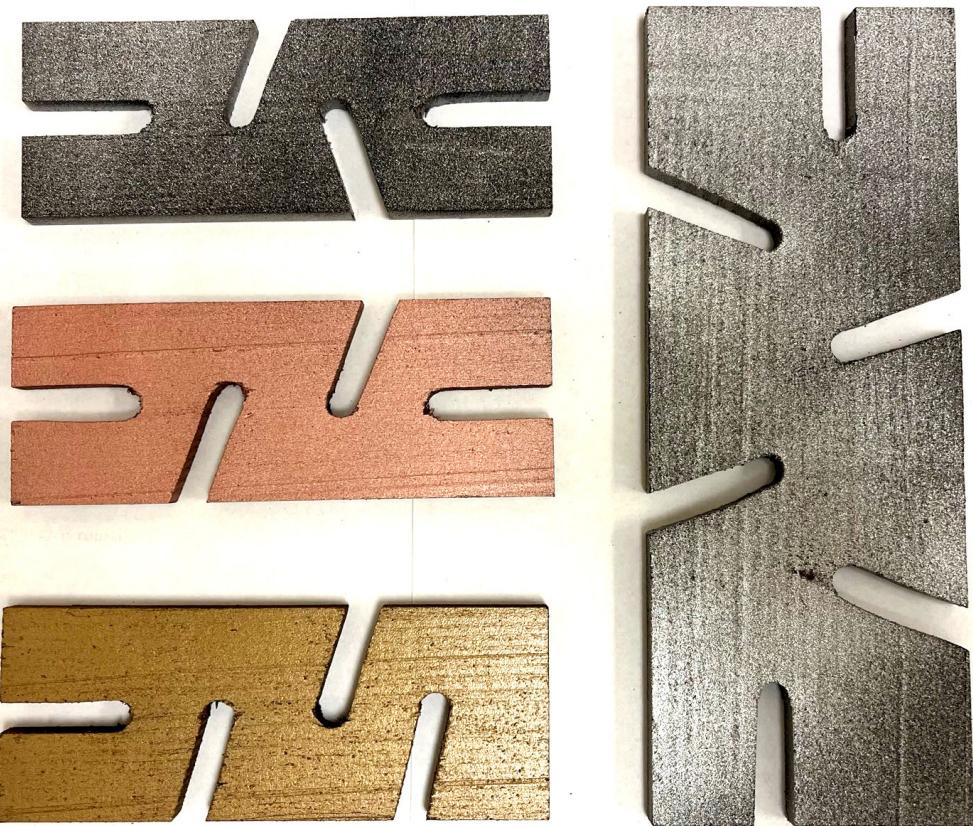
SHINTARO FUSHIDA-HARDY, WITH PETER HUXFORD



FROGBIT NETWORK, 2024

AN APERIODIC MODULAR SCULPTURE

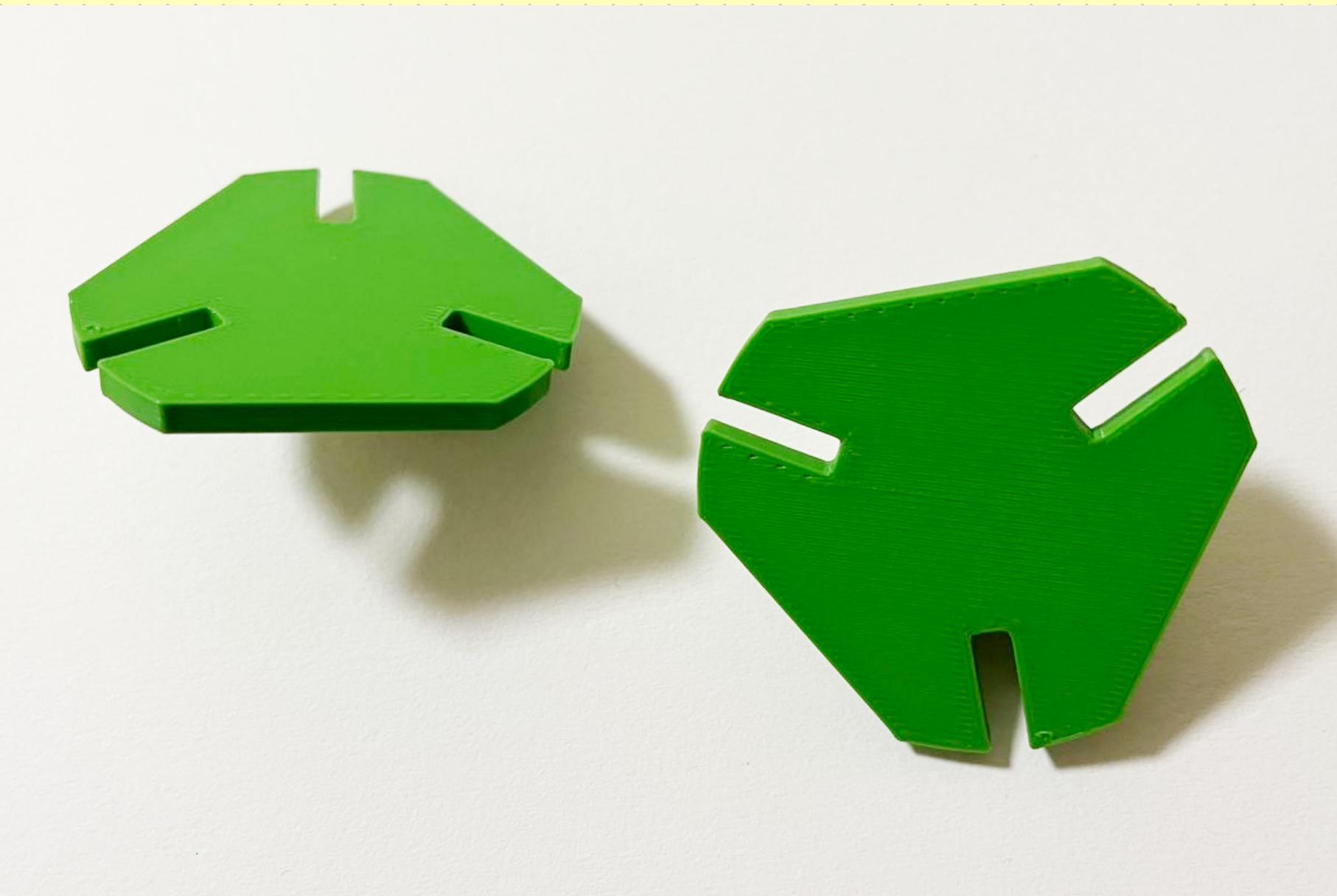
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FLOWERMOUNTAIN, 2022

AN APERIODIC MODULAR SCULPTURE

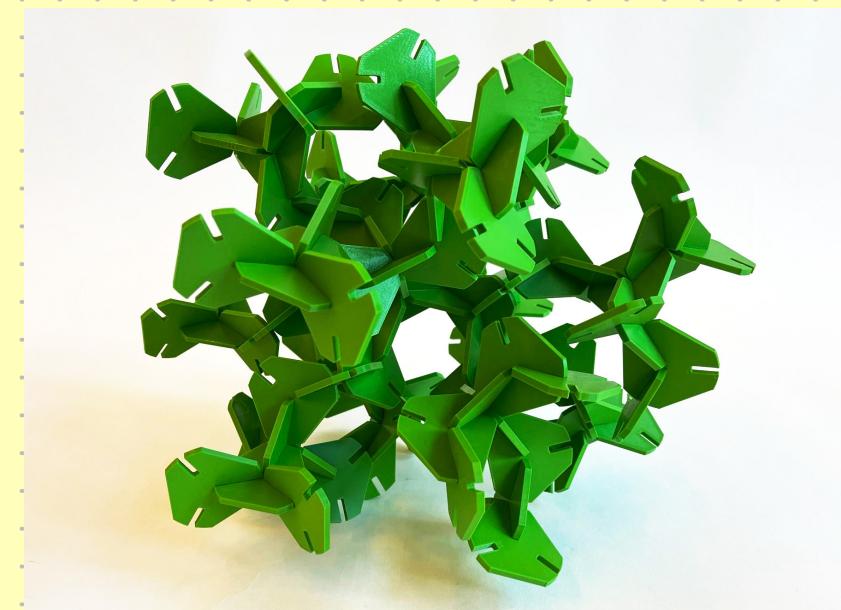
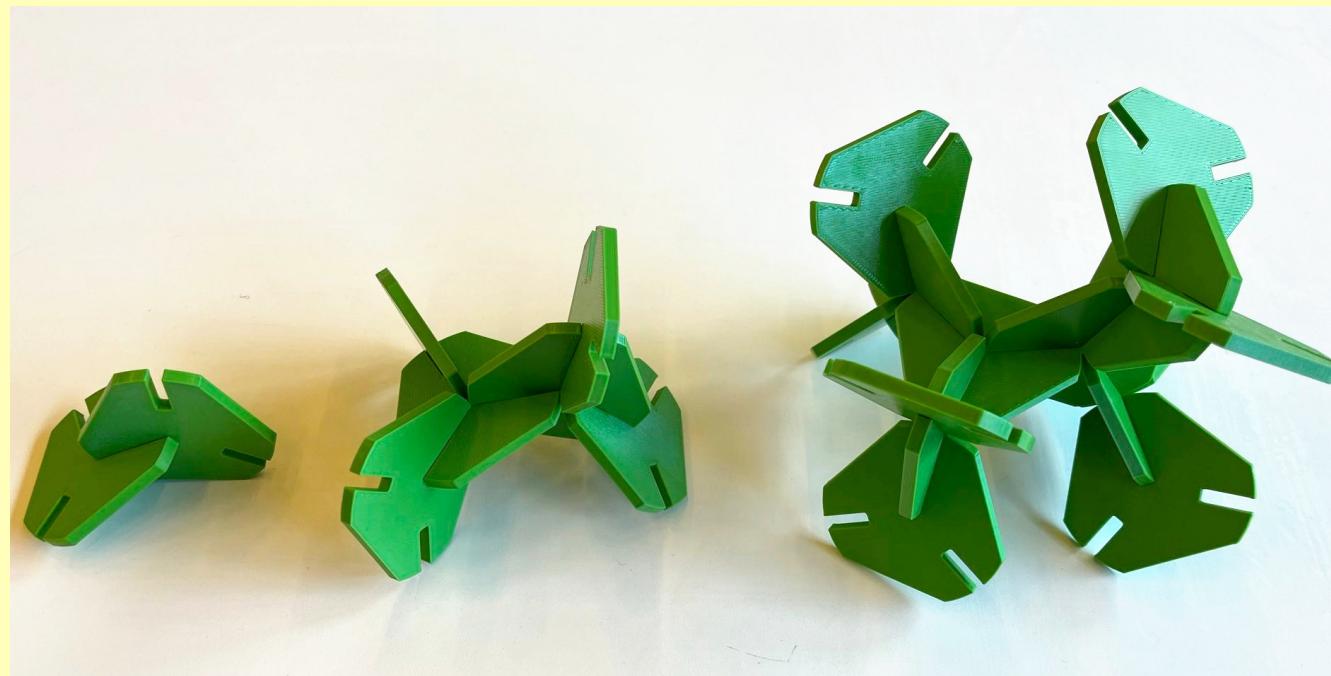
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THE MODULES

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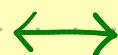
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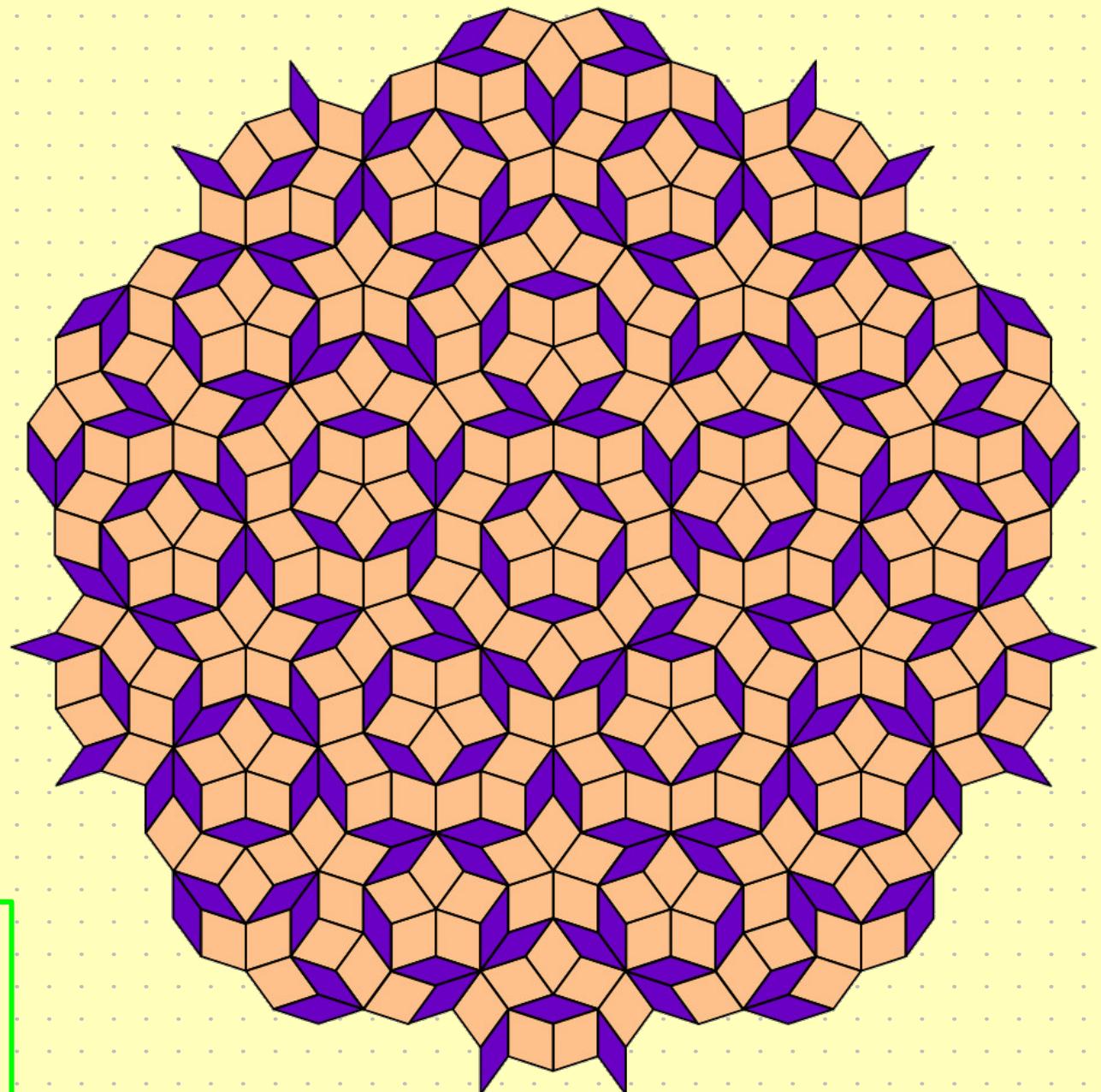
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APERIODIC



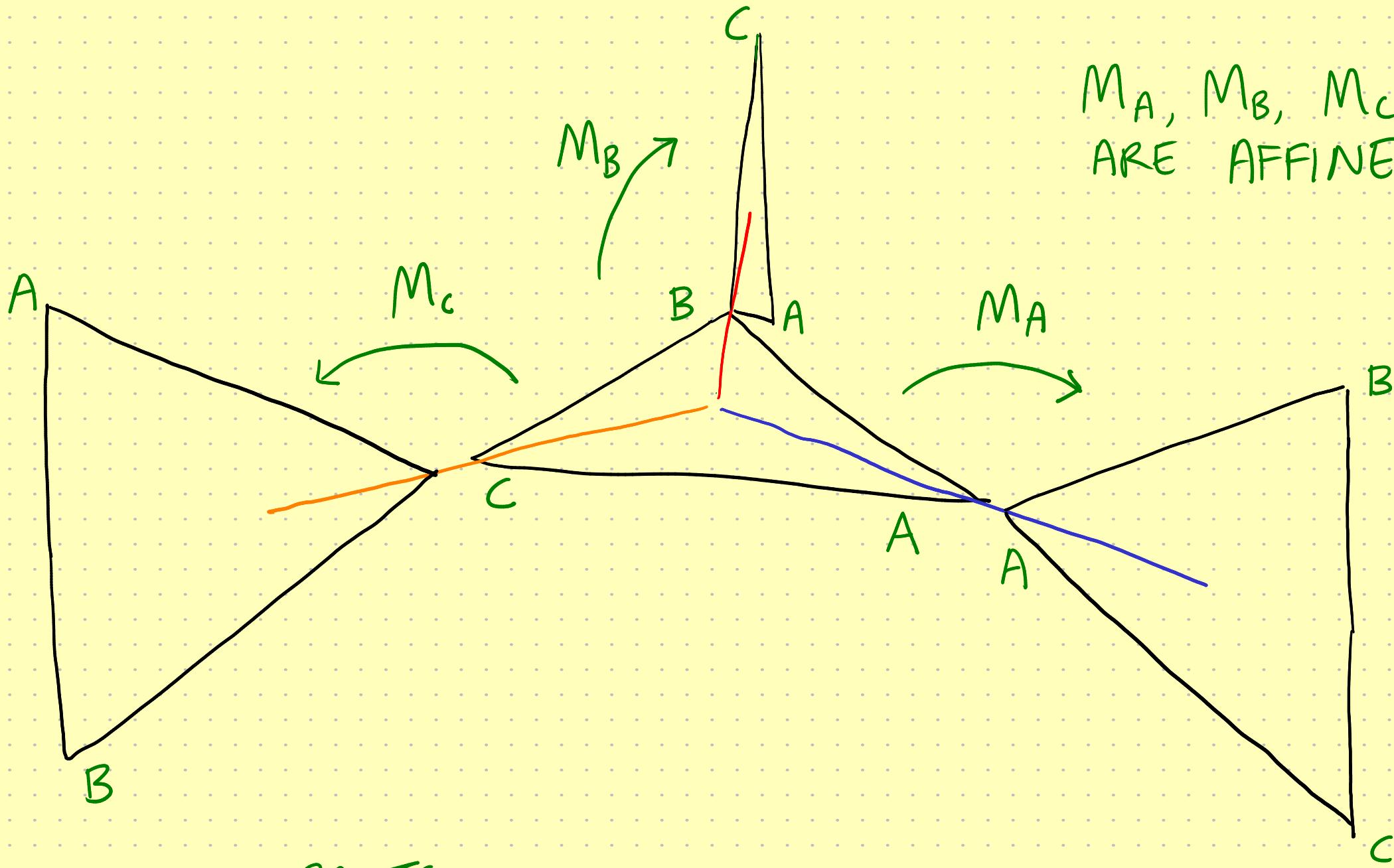
NO TRANSLATIONAL
SYMMETRIES

PENROSE TILING,
EXHIBITING 5-FOLD
ROTATIONAL SYMMETRY



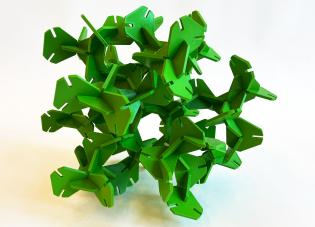
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ROTATIONAL PARTS:

$$ROT(M_A) = a = \begin{pmatrix} -1 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & 1 & 0 \end{pmatrix}, \quad b = \frac{1}{4} \begin{pmatrix} -1 - \sqrt{3} & 2\sqrt{3} \\ -\sqrt{3} & -3 & -2 \\ 2\sqrt{3} - 2 & 0 \end{pmatrix}, \quad c = \frac{1}{4} \begin{pmatrix} -1 & \sqrt{3} & -2\sqrt{3} \\ \sqrt{3} & -3 & -2 \\ 2\sqrt{3} - 2 & 0 \end{pmatrix}$$

"WHAT ARE THE
SYMMETRIES
OF 

"WHAT IS
 $\langle a, b, c \rangle$ "



CONJECTURE:

$$\begin{aligned}\langle a, b, c \rangle &= \langle a \rangle * \langle b \rangle * \langle c \rangle \\ &= \mathbb{Z}_{2\mathbb{Z}} * \mathbb{Z}_{2\mathbb{Z}} * \mathbb{Z}_{2\mathbb{Z}}\end{aligned}$$

$$\langle a, b, c \rangle = \mathbb{Z}/2\mathbb{Z} * \mathbb{Z}/2\mathbb{Z} * \mathbb{Z}/2\mathbb{Z} ?$$

- NO TRANSLATIONAL SYMMETRY
- NO CLOSED LOOPS, OF ANY SIZE !

EQUIVALENT REFORMULATION: "IS $\langle ba, ac \rangle \approx F_2 ?$ "

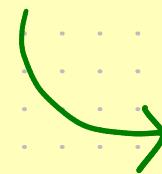
HOW CAN WE PROVE THIS?

- PING-PONG LEMMA IN \mathbb{R}^3 , $SO(3, \mathbb{R})$ ETC X
- STATE OF THE ART:
 - CHOOSE SOME p , RUN ALGORITHM IN $SL(2, \mathbb{Q}_p)$. (CONDER, 2020) X

EQUIVALENT REFORMULATION: "IS $\langle ba, ac \rangle \approx F_2 ?$ "

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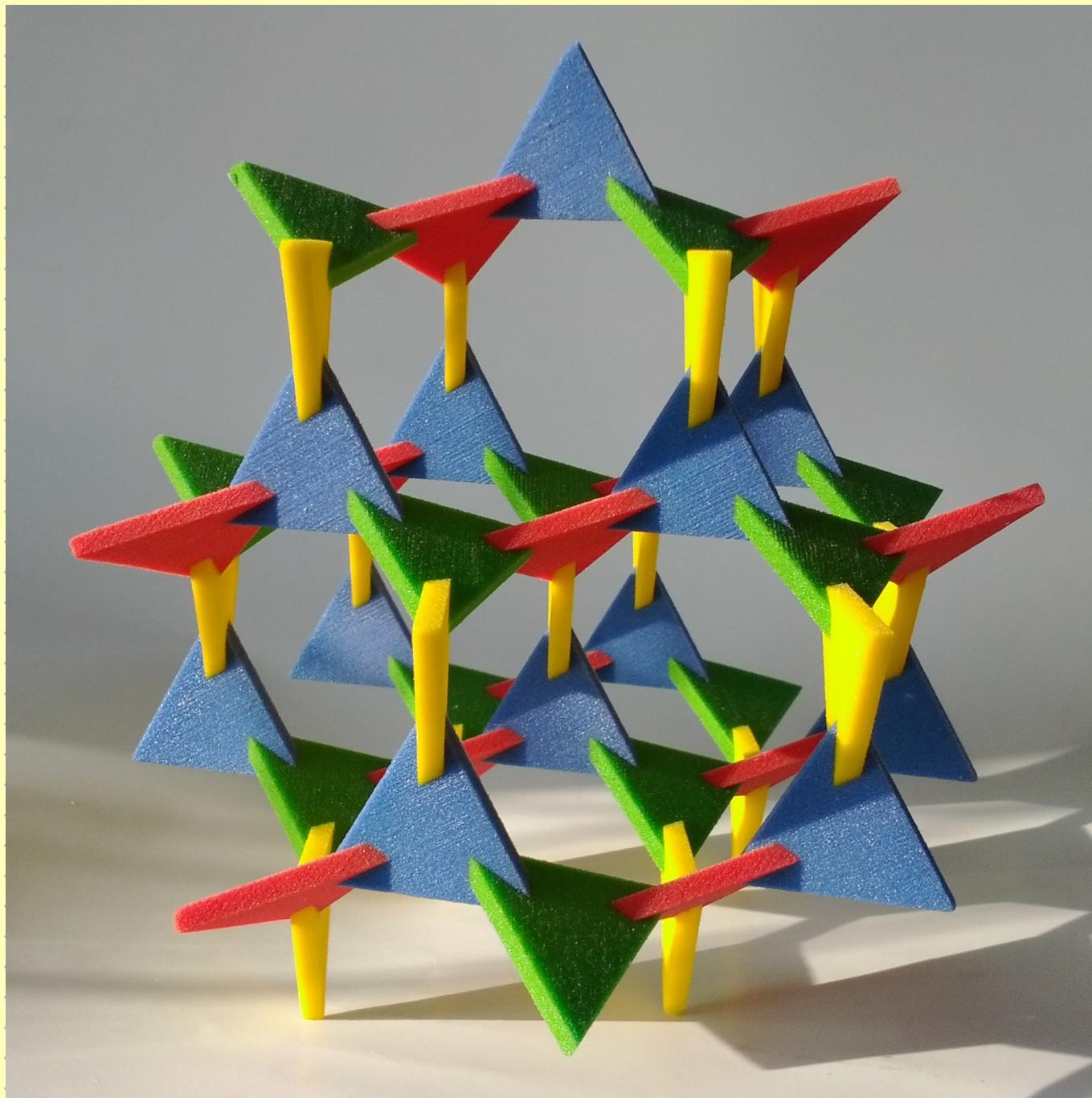
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DOLGACHEV, ALLCOCK
PROVED "ROTATIONS ABOUT
DIAGONALS OF A CUBE"
ARE APERIODIC.

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BAMBOOZLE, 2012

K. VERHOEFF, T. VERHOEFF, A. BAKKER

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THANK YOU!

