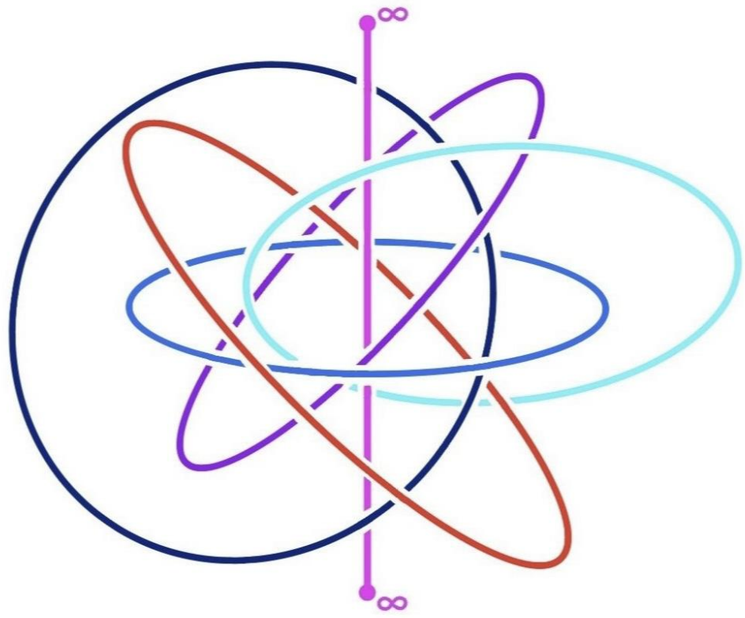
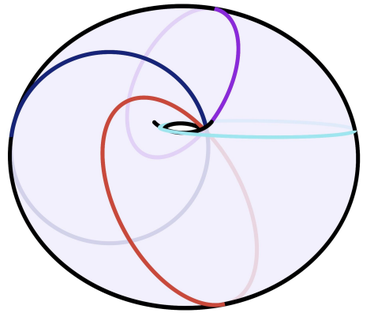
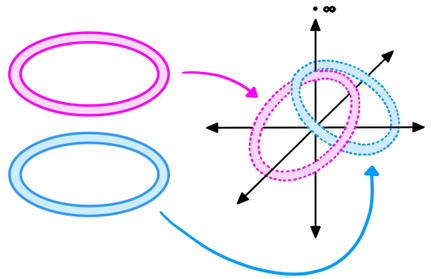
Geometric Design of Geometric Designs

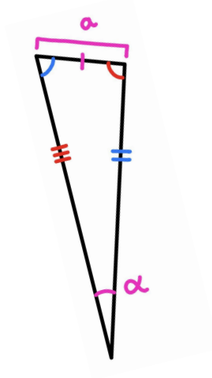


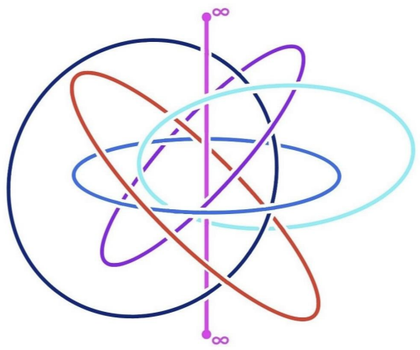
Ayodeji Lindblad

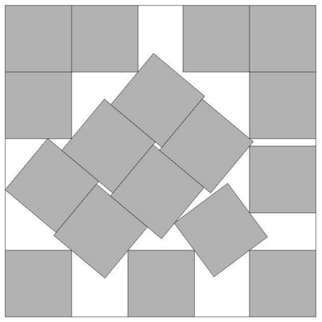
Geometry & Topology

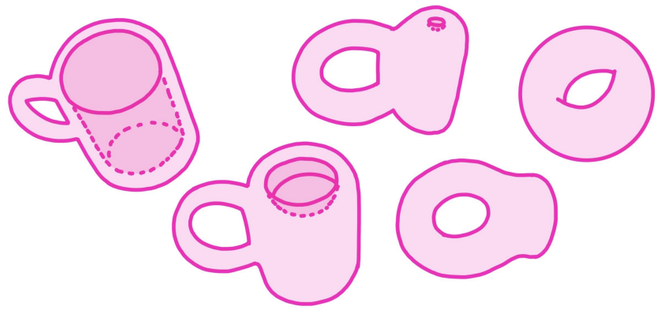


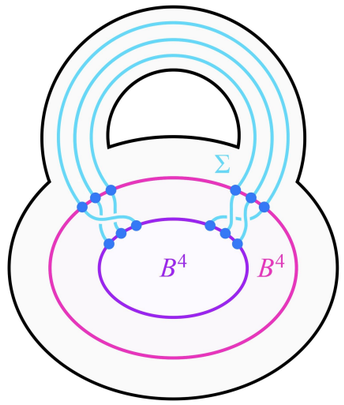


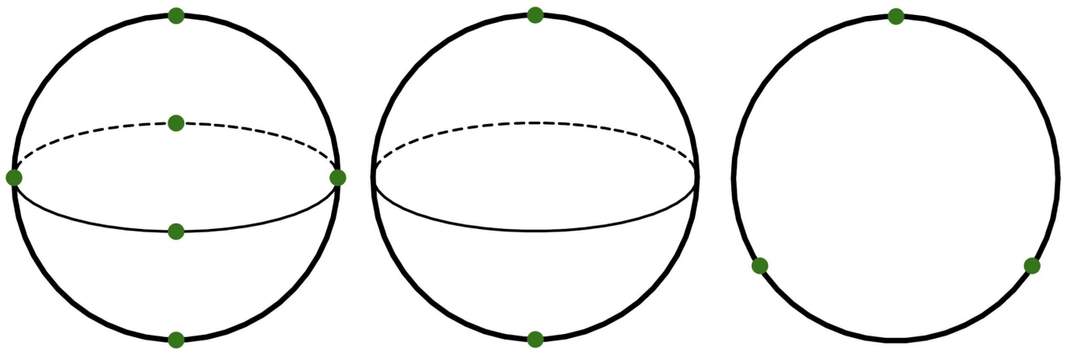


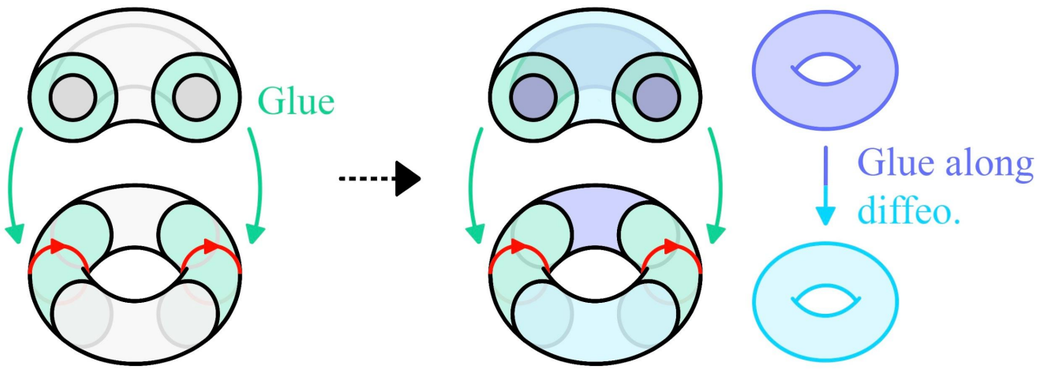






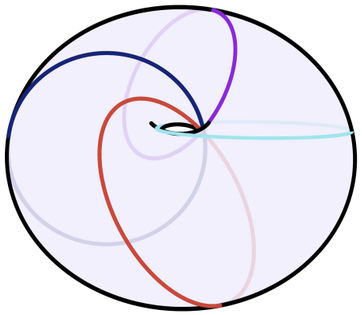


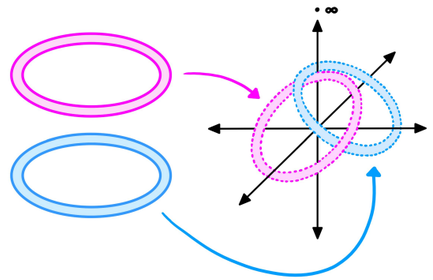


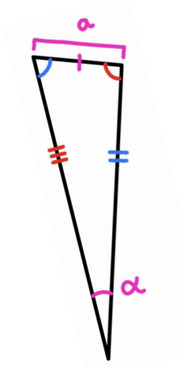


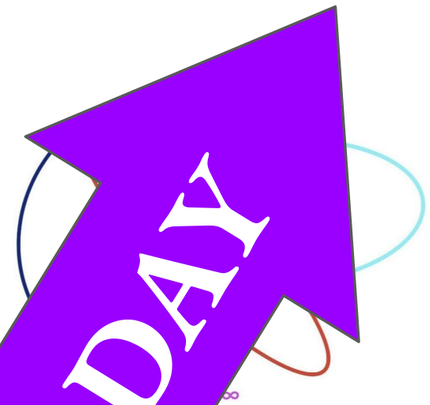
Geometry

Topology

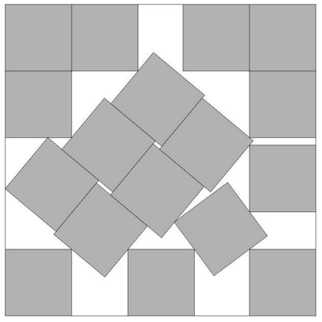


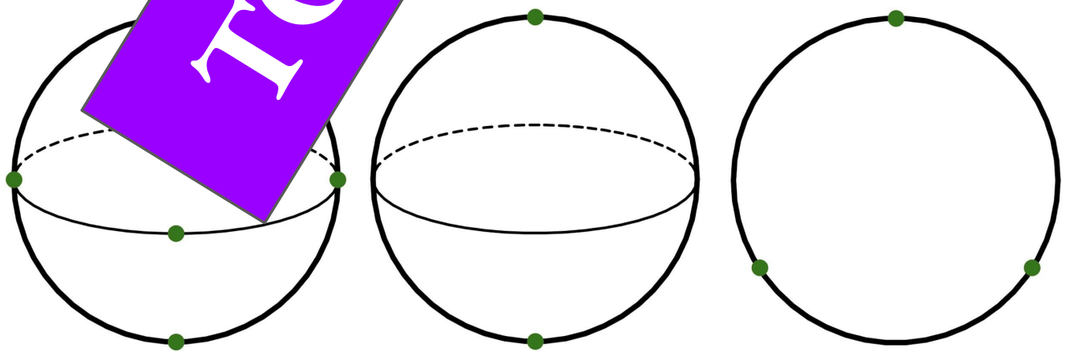


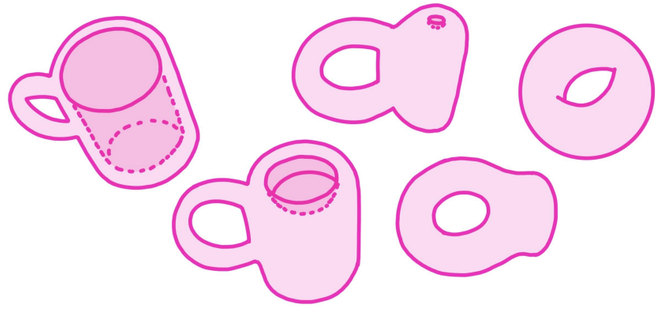


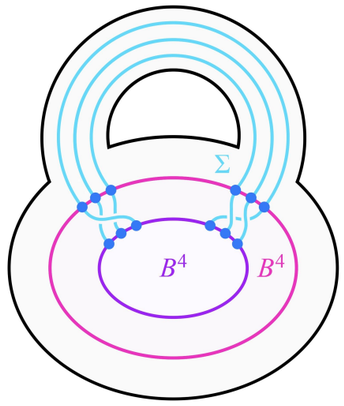


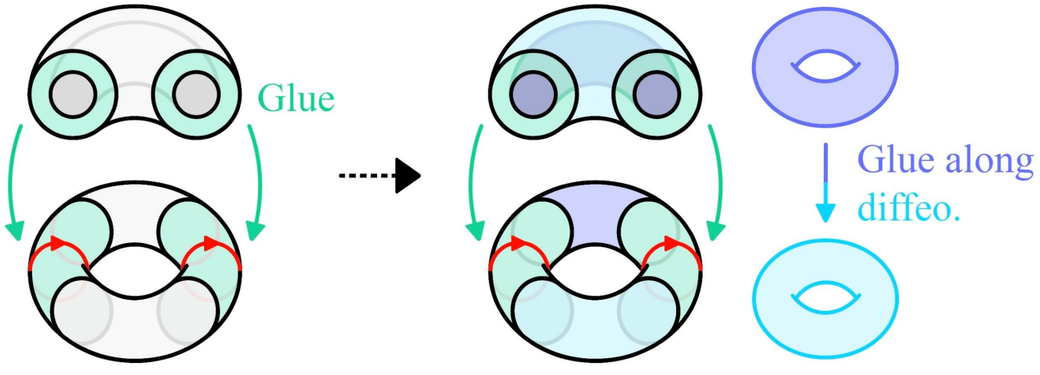
TODAY





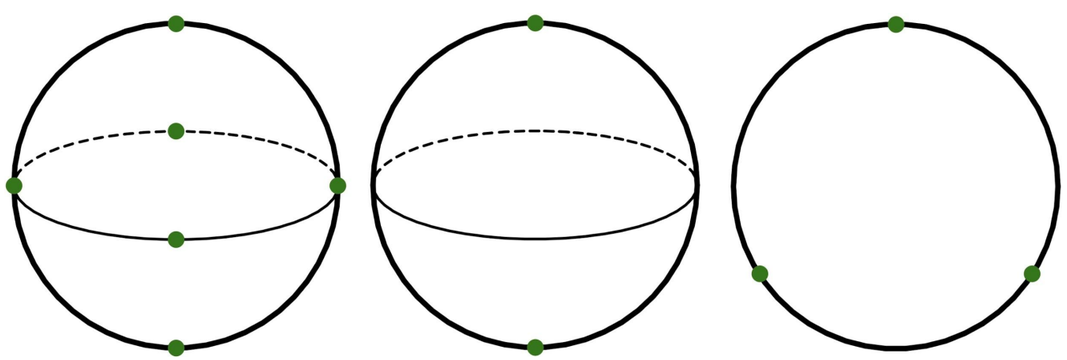






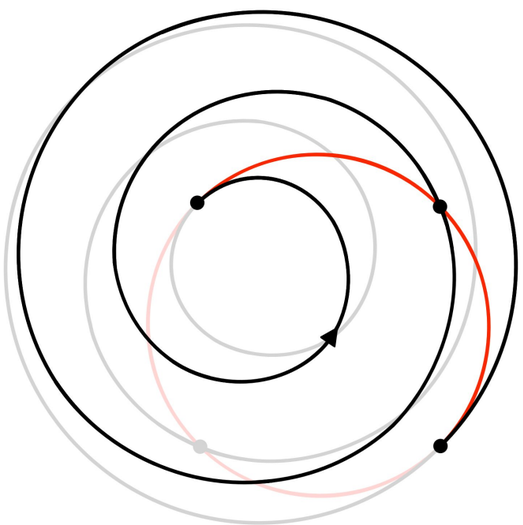
Geometric Designs

- Special subsets of shapes (often points or curves on the d-dimensional sphere)
- Average polynomials of degree $\leq t$ exactly!
- Tell you how to *design* experiments



$x^3y^4z - 2z^2$

$xy^3 - 493y^8$

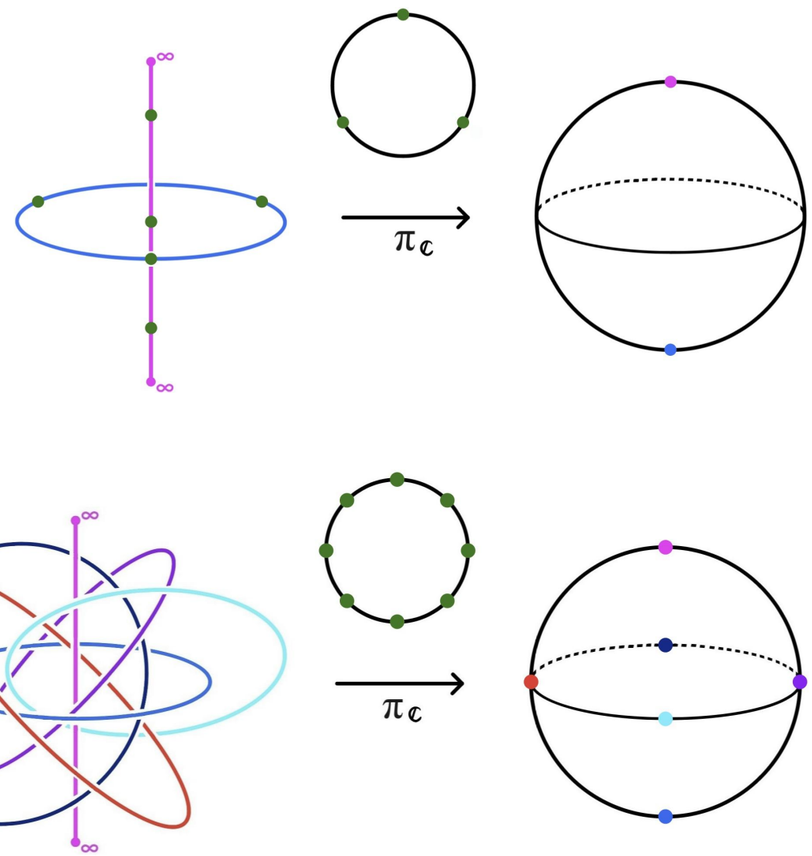


Design of Geometric Designs

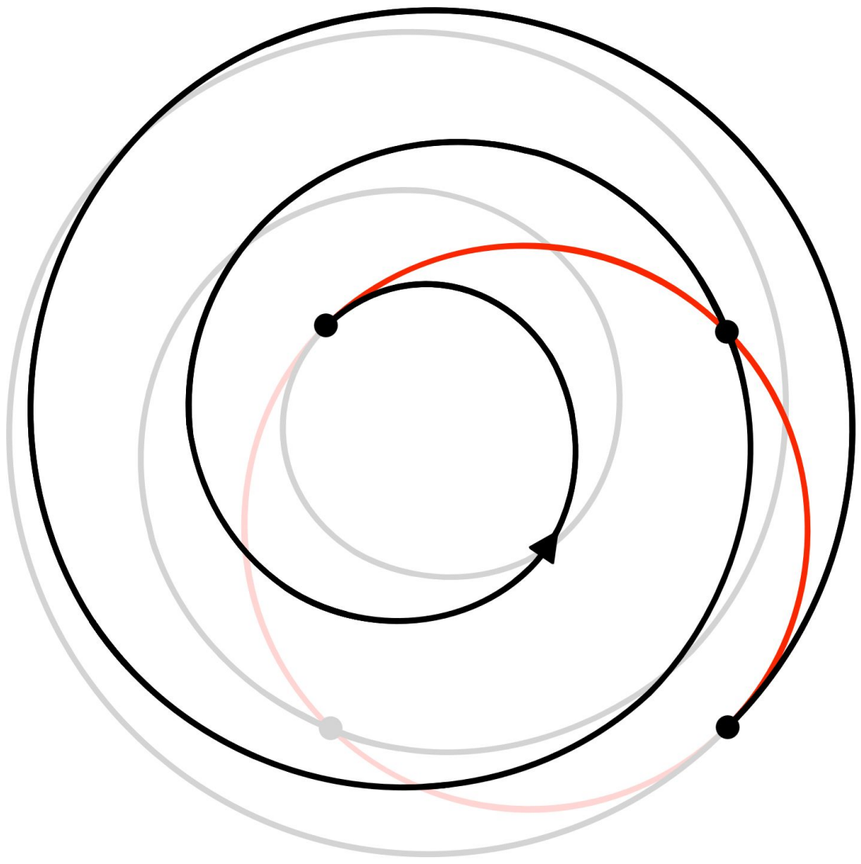
- Want explicit designs for applications
- Making them is hard!
- Special sets like vertices of platonic solids give good designs
- Numerical approximations
- We know a lot about geometry. Can we use this?

Geometric Design of Geometric Designs

- My work: using geometric symmetries to build designs
- Harder to build in higher dimensions, stitch together lower-dimensional designs to build higher-dimensional ones



Applications



- New explicit designs for practitioners to use
- Lifting asymptotic results to answer questions of interest to mathematicians
- Learning more about geometry!

More to Come...

- Generalizations that reveal the full mathematical truth behind these constructions
- More applicable examples
- Extensions which could be useful and easier to build
- More pictures to draw! :)