

# Interesting Topological Spaces in Algebraic Geometry

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### 1 Ideas for Spaces

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- Curves
  - Elliptic Curves
  - Higher genus
  - Hyperelliptic curves
  - The modular curve
- Surfaces
  - Compact Riemann surfaces
    - \* Bolza Surface (Genus 2)
    - \* Klein Quartic (Genus 3)
    - \* Hurwitz Surfaces
  - Kummer surfaces
  - Del Pezzo surfaces
- Compact Complex Surfaces
  - Rational ruled
  - Enriques Surfaces
  - $K3$ 
    - \* Kahler Manifolds
  - Kodaira
  - Toric
  - Hyperelliptic
  - Properly quasi-elliptic
  - General type
  - Type VII
- Fake projective planes
- Conics
- Calabi-Yau manifolds
  - Dimension 1: All elliptic curves (up to homeomorphism)

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- Dimension 2:  $K3$  surfaces
  - Dimension 3 (threefolds): 500 million +, unknown if finitely many
  - The bananafold
  - Hurwitz schemes
  - Topological galois groups, e.g.  $G(\bar{F}/F)$  for  $F = \mathbb{Q}, \mathbb{F}_p$ .
  - $\text{Spec}(R)$  for  $R$  a DVR (a Sierpinski space)
  - Quiver Grassmannians
  - Rigid analytic spaces
  - Affine line with two origins
  - Moduli stack of elliptic curves  $\mathcal{M}_{1,1}$ .
  - Abelian Surface
  - Fano Varieties