

Algebra

↳ Rings ( $\mathbb{Z}$ )

↳ Fields ( $\mathbb{R}, \mathbb{C}, \mathbb{Q}$ )

↳ Monoids ( $\mathbb{N}$ )

Polynomials  $f = x^2 + y^2 + z^2 - 1$

Algebraic Geometry

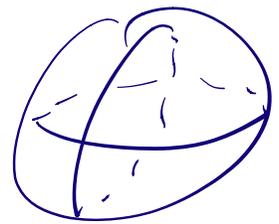
Zeros  
 $\{(x, y, z) \mid f(x, y, z) = 0\}$

Geometry

↳ Curves / surfaces



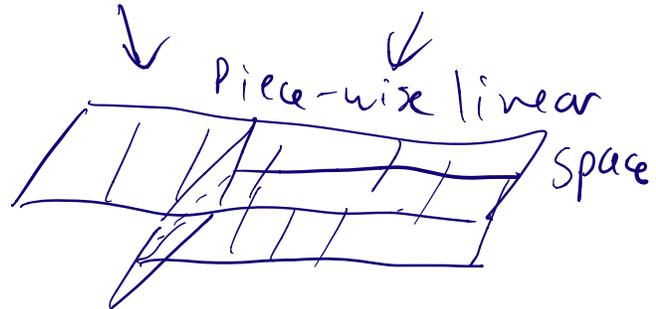
algebraic varieties



Shapes of the universe

$\mathbb{R}^3$   
expanded space  
 $\times$   
 $\mathbb{R}_{z_0}$   
time  
 $X$   
contracted space.  
6-dim

Physics  $X_1$  deformation Symmetric Physics  $X_2$



# Tropical Geometry

Geometry coming from  
Polynomials defined  
on  $\mathbb{C}^n$

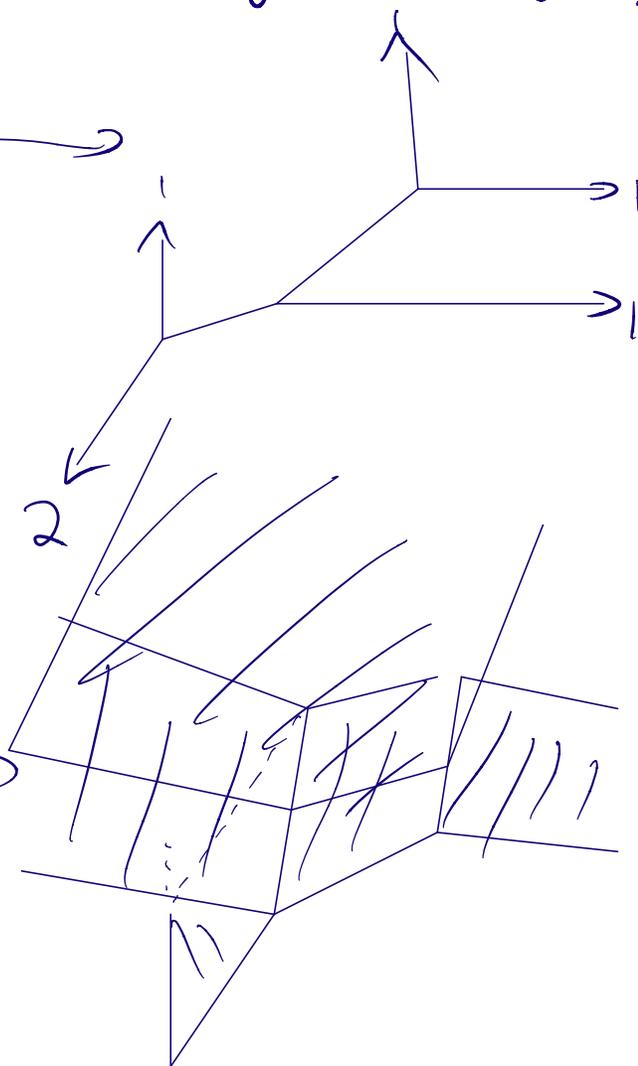
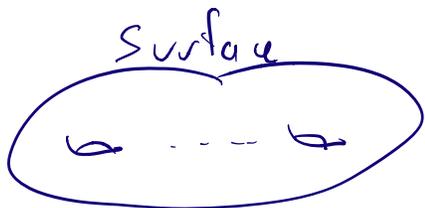
Polyhedral Complexes  
defined in  $\mathbb{R}^n$



$$(\mathbb{C} - \{0\})^n \longrightarrow \mathbb{R}^n$$

$$(z_1, \dots, z_n) \longmapsto (\log |z_1|, \dots, \log |z_n|)$$

$$(\log |z_1|, \dots, \log |z_n|)$$



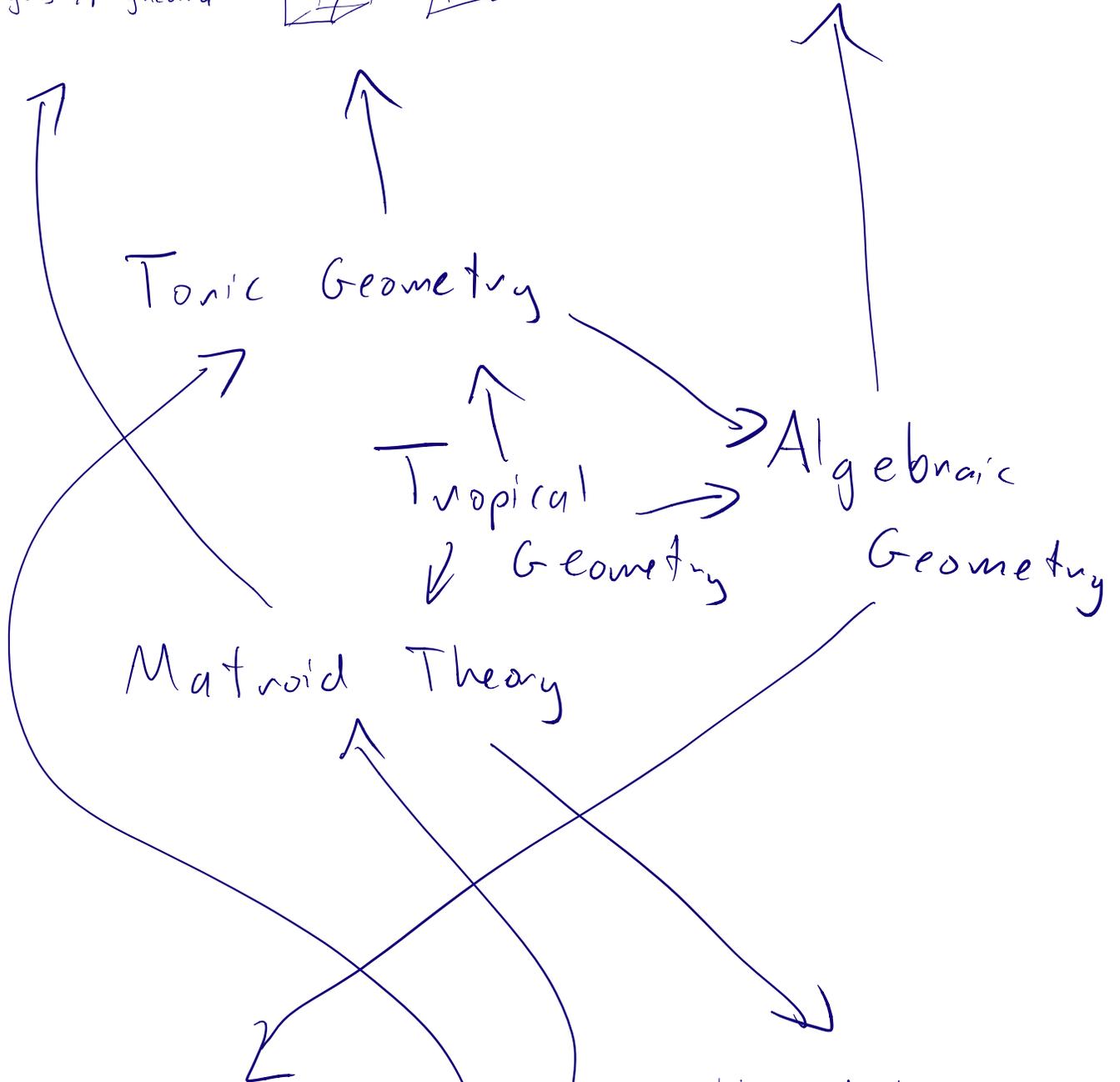
# Discrete Math

- ↳ Sets
- ↳ Graphs
- ↳ lattices / partial orderings.
- ↳ polygons / polyhedra



# Algebra

- ↳ Rings ( $\mathbb{Z}$ , polynomials)
- ↳ Fields ( $\mathbb{R}, \mathbb{C}, \mathbb{Q}$ )
- ↳ Monoids ( $\mathbb{N}$ )



# Geometry

- ↳ Curves / surfaces



# Linear Algebra

- ↳ vectors
- ↳ linear transformations
- ↳ independence / dependence.

Sebastian's Honors Thesis: Tuesday April 16, 12:30-2

Nicolas' Honors Thesis: Wed. April 17, 11:00-12