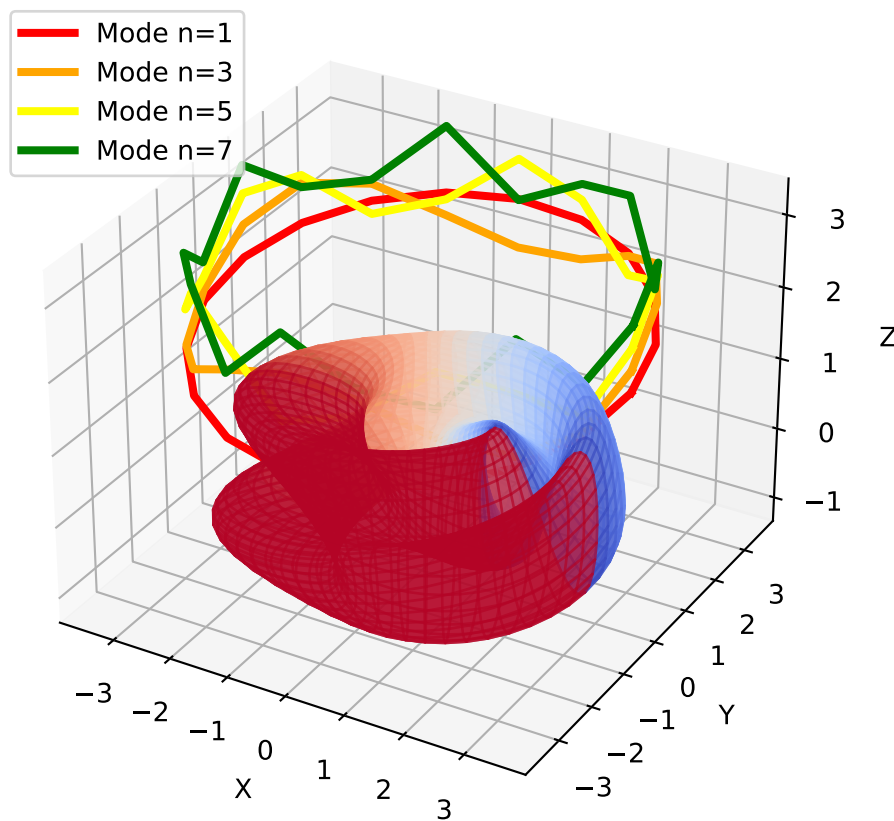


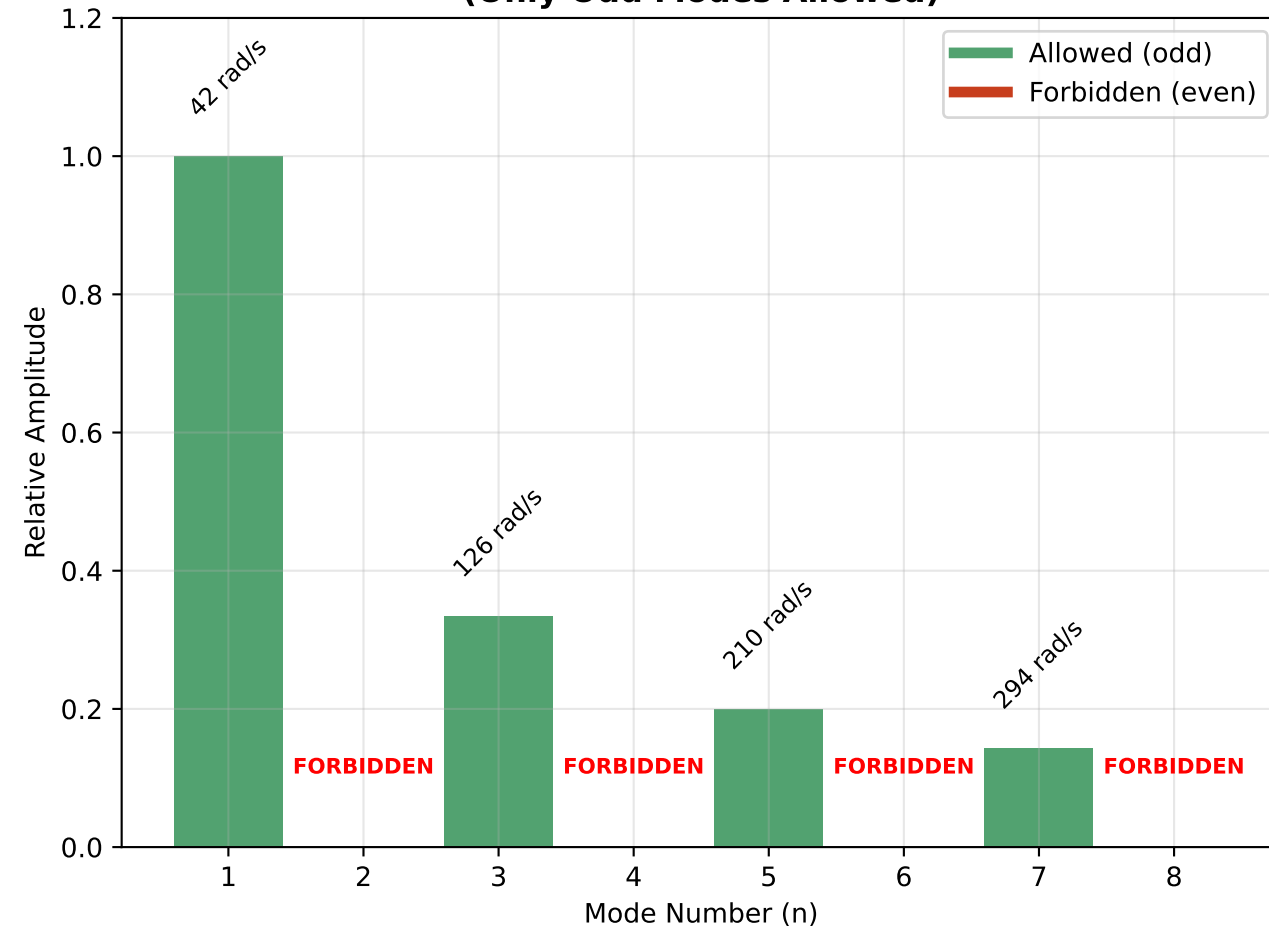
# Klein Bottle Topology: Fifth Dimension Structure

$$R = 1751.173 \text{ km}, \omega_0 = 42 \text{ rad/s}$$

5D Klein Bottle Topology  
(Non-Orientable Surface)

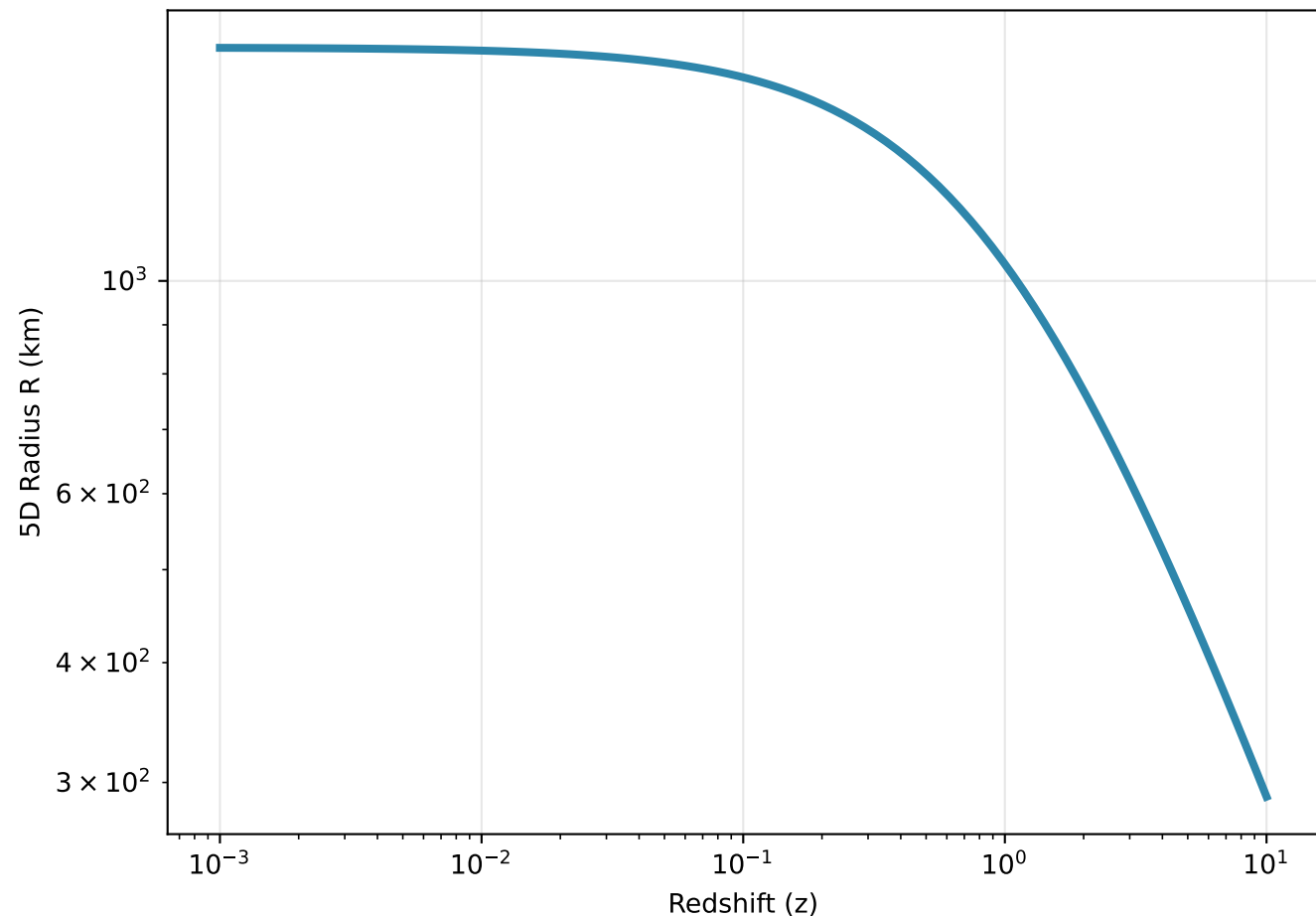


Klein Bottle Mode Spectrum  
(Only Odd Modes Allowed)

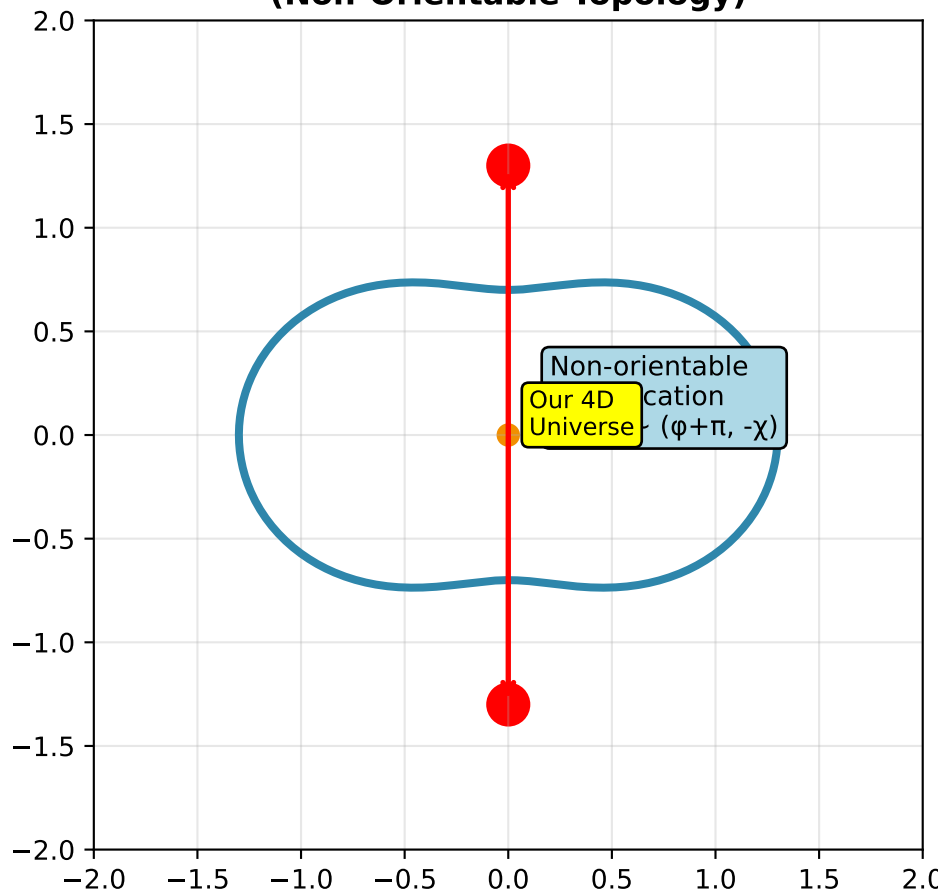


Dimensional Evolution

$$R(t) \propto a(t)^{3/4}$$



Klein Bottle Cross-Section  
(Non-Orientable Topology)



## KLEIN BOTTLE PARAMETERS

### Fundamental Frequency:

$$\omega_0 = 42.00 \text{ rad/s}$$

$$f_0 = 6.68 \text{ Hz}$$

$$\tau = 0.1496 \text{ s}$$

### Dimensional Scale:

$$R = 1751.173 \text{ km}$$

(Not ~1000 km!)

### 5D Medium Properties:

$$\rho_{5D} = 4.45 \times 10^{19} \text{ kg/m}^3$$

$$K = 10^{35} \text{ Pa}$$

$$c_{\text{eff}} = c/6.403$$

### Dark Matter Connection:

$$\rho_{\text{DM}} = N_{\text{eff}} \times \hbar c / (2\pi R^4 c^2)$$

$$N_{\text{eff}} = 4.02 \times 10^{41}$$

### Topological Properties:

• Non-orientable surface

• Only odd modes allowed

$$\pi_1(\text{Klein}) = \mathbb{Z} \oplus \mathbb{Z}$$

$$\chi(\text{Klein}) = 0$$

### Evolution:

$$R(t) \propto a(t)^{3/4}$$