PROTON EXPRESS

INTRODUCTION

Welcome & security announcement - strong magnet and high voltage

➔ Volunteer: no pregnancy, no sensitive medical device, no heart condition

Questions about CERN and fundamental questions

Build the LHC accelerator - IKEA instructions

GETTING THE PROTONS

Where can we find protons – **Plasma (lighter)**

Wimshurst Machine and candle [volunteer]

ACCELERATING THE PROTONS

Van de Graaff generator with aluminum saucers

Walking demo (optional)

STEERING THE PROTONS

CRT TV with permanent magnet

Electromagnet [volunteer]

Superconductor cable prop [Niobium Titanium, 13000 A, -271°C]

COOLING THE SUPERCONDUCTOR

Liquid Nitrogen [-196°C, 20 million L]

Challenges: Fragility: **rubber and tube demo**

Pressure: **kettle demo** [1L liquid = 690L gas]

Contraction: **ball and ring apparatus** [LHC shrinks 80m]

FINALE

Levitating train [YBCO – Yttrium Barium Copper Oxide]

Wrap up & Overview