

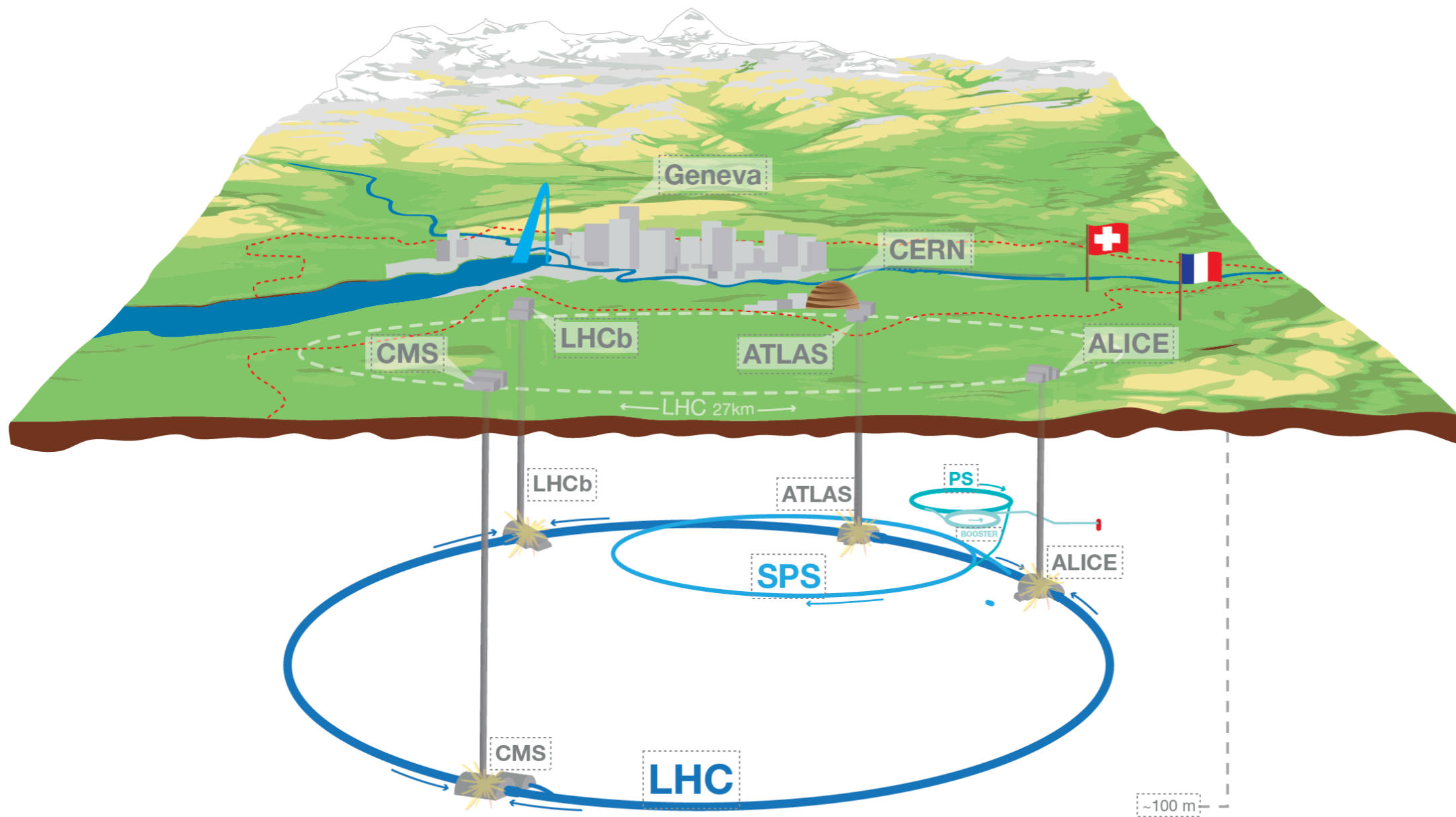


REACHING NEW AUDIENCES

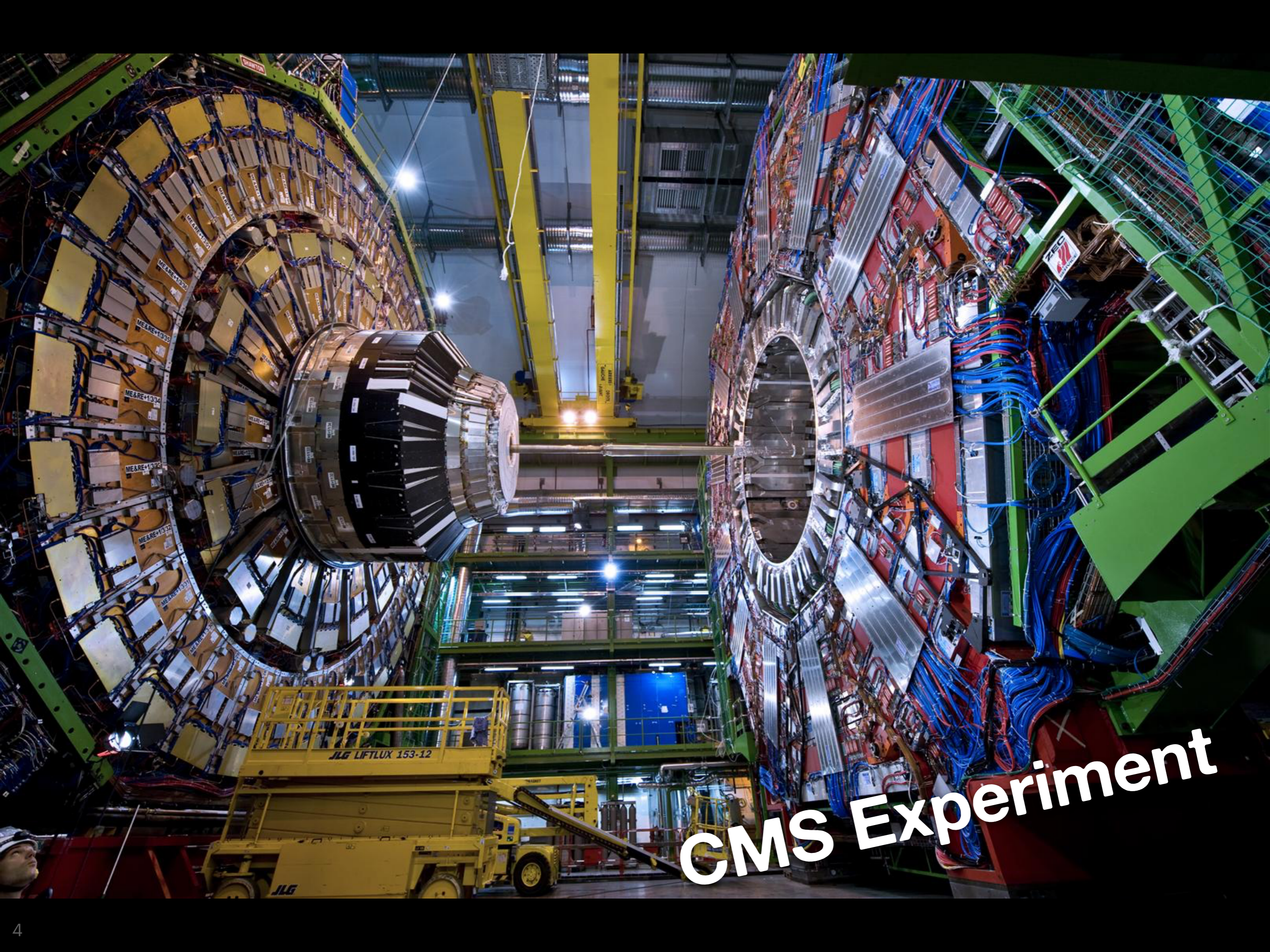
INJECTING PHYSICS INTO CULTURE

LAWRENCE LEE

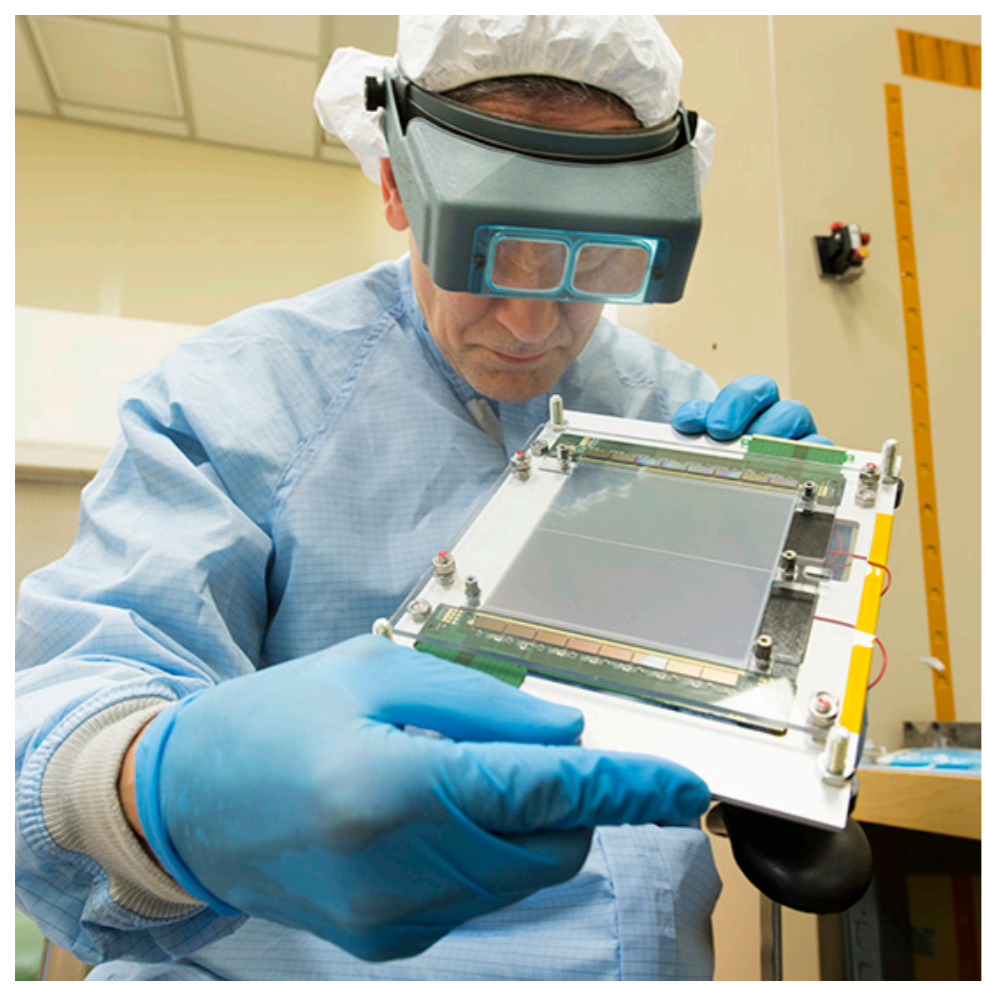
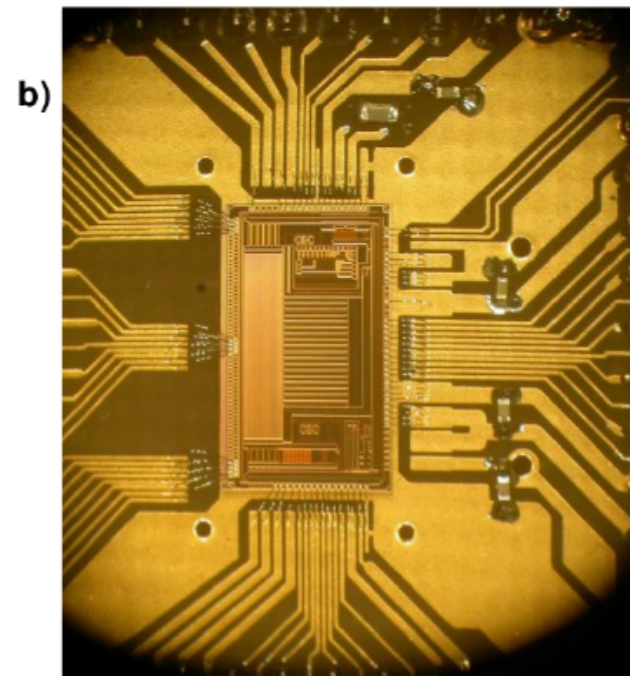
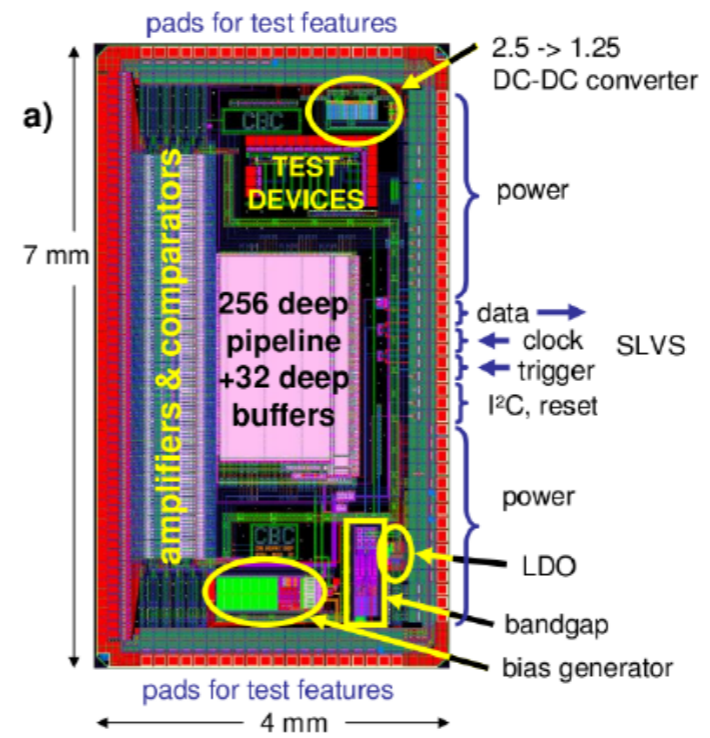
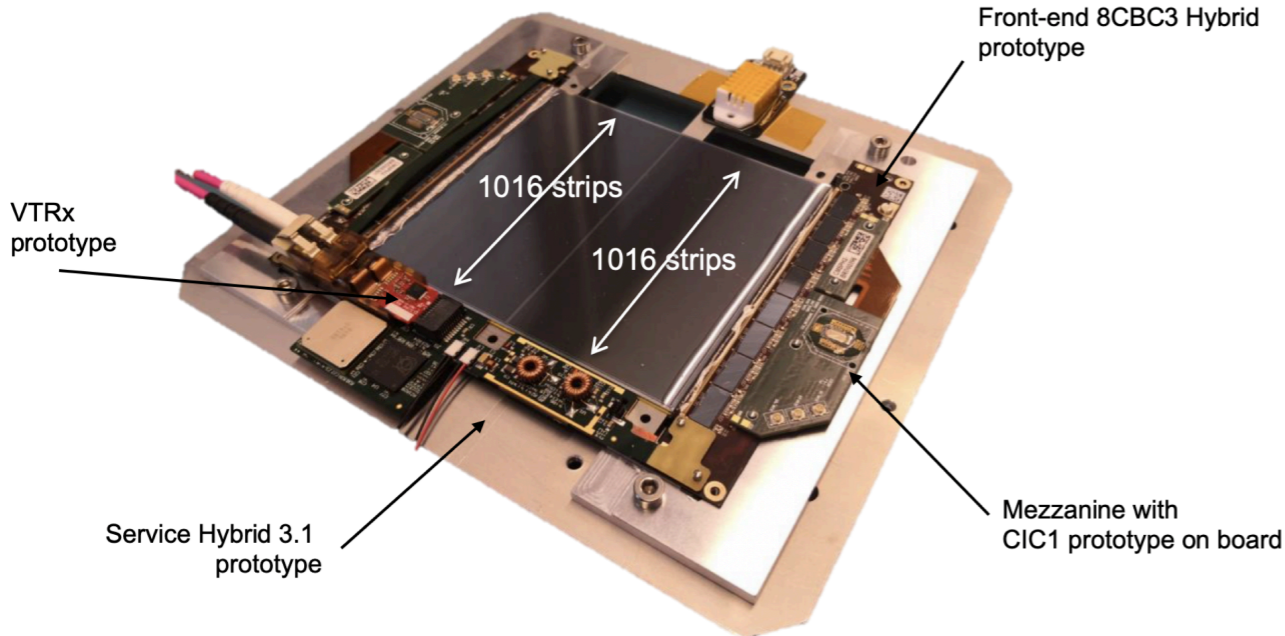
DAY JOB



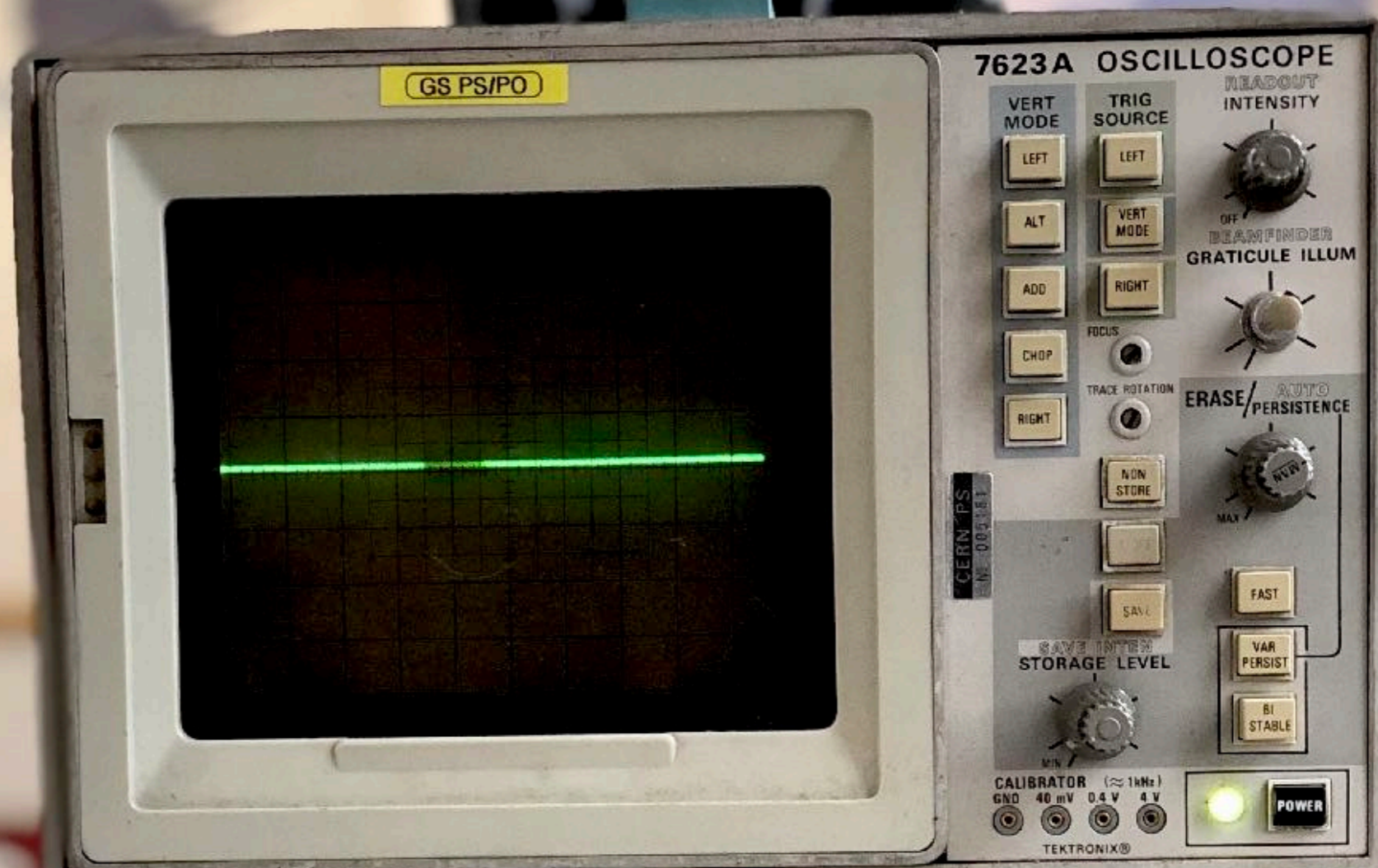
Large Hadron Collider



CMS Experiment



**Complex Custom
Electronics**



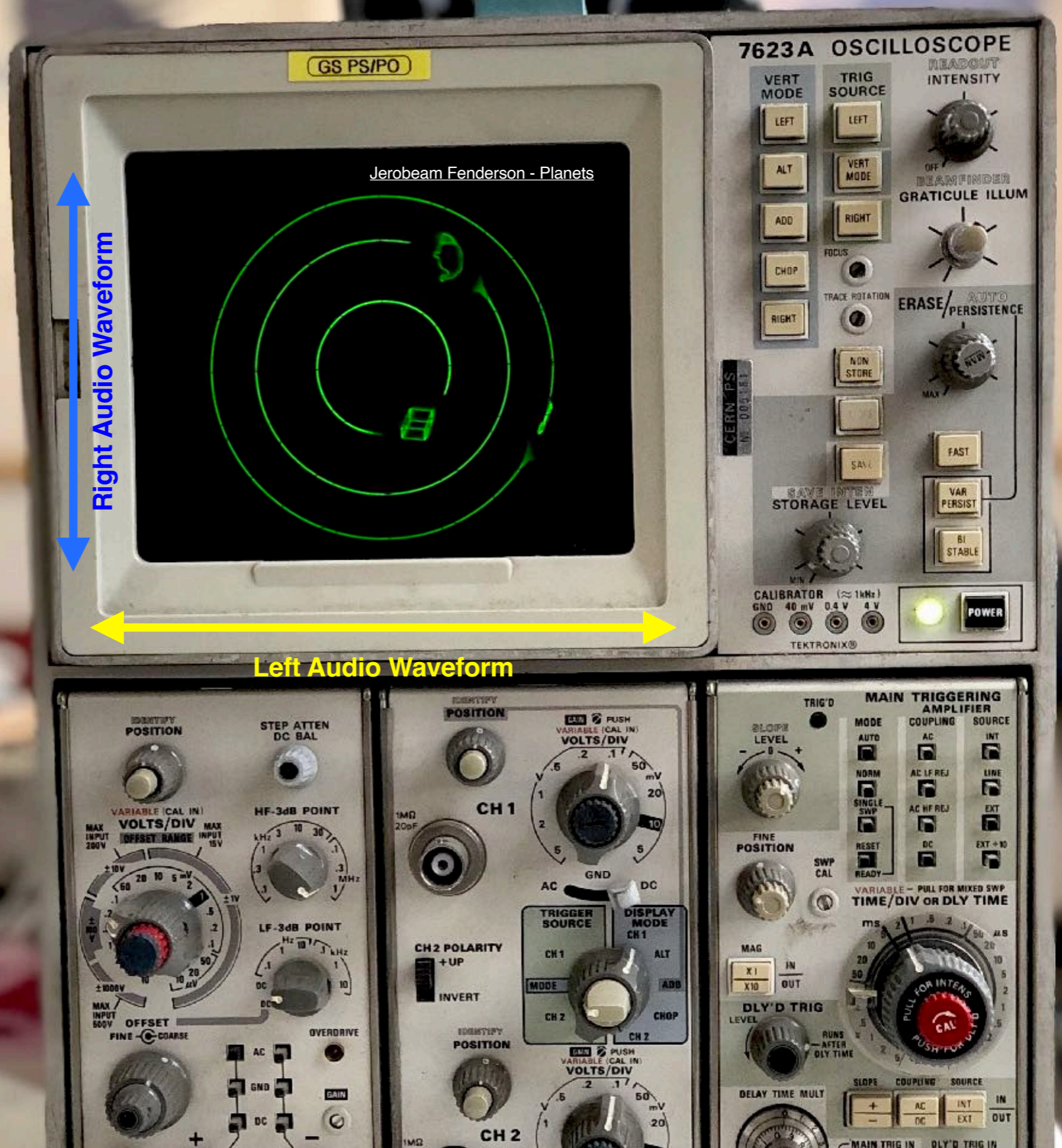
Late 70's

From the

Proton Synchrotron at CERN

NIGHT JOB

OSCILLOSCOPE MUSIC

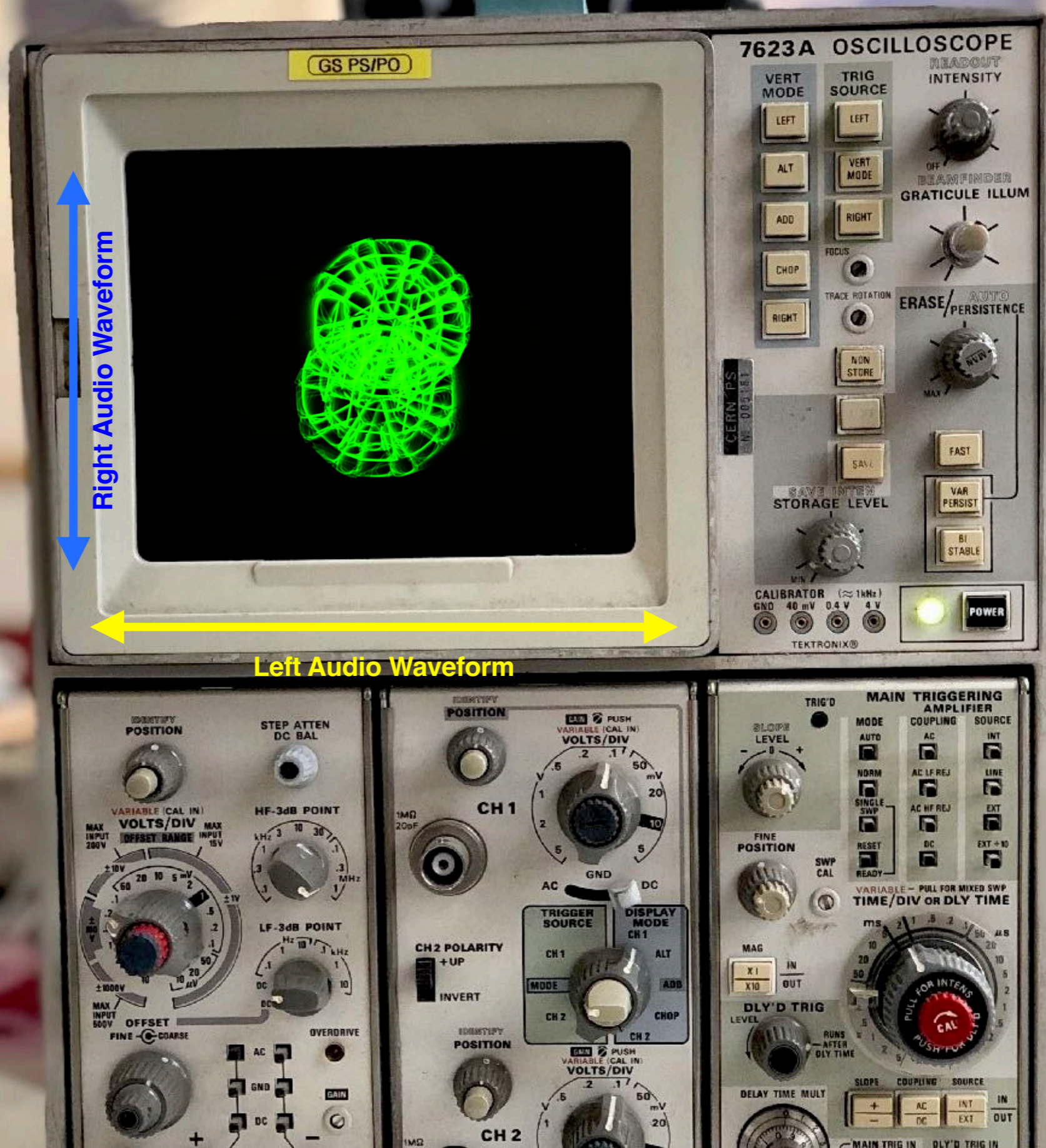


CILLOSCOPE MUSIC

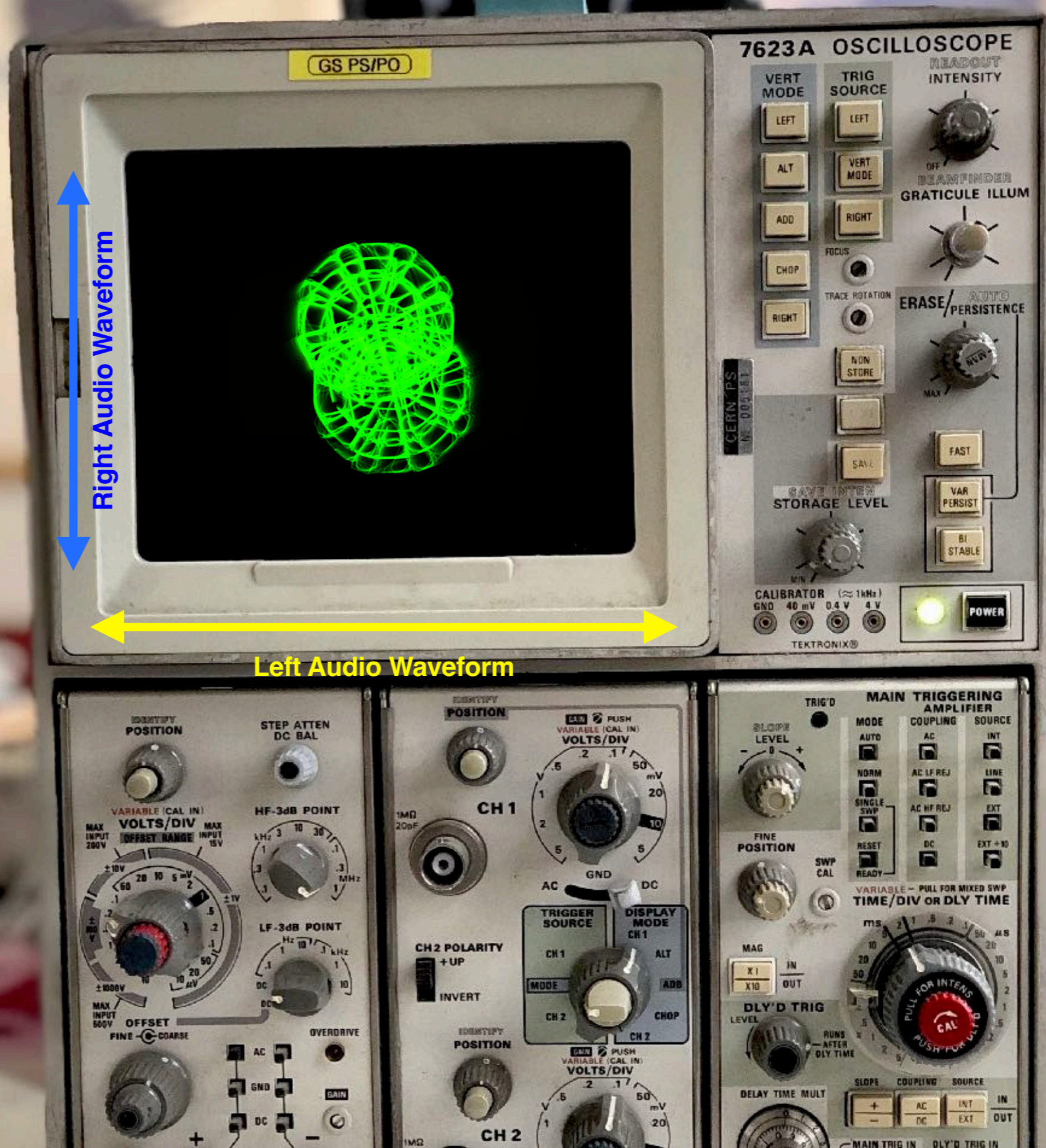


**REVERSE-ENGINEERED
LISSAJOUS FIGURES**

LHC SYNTHESIZERS



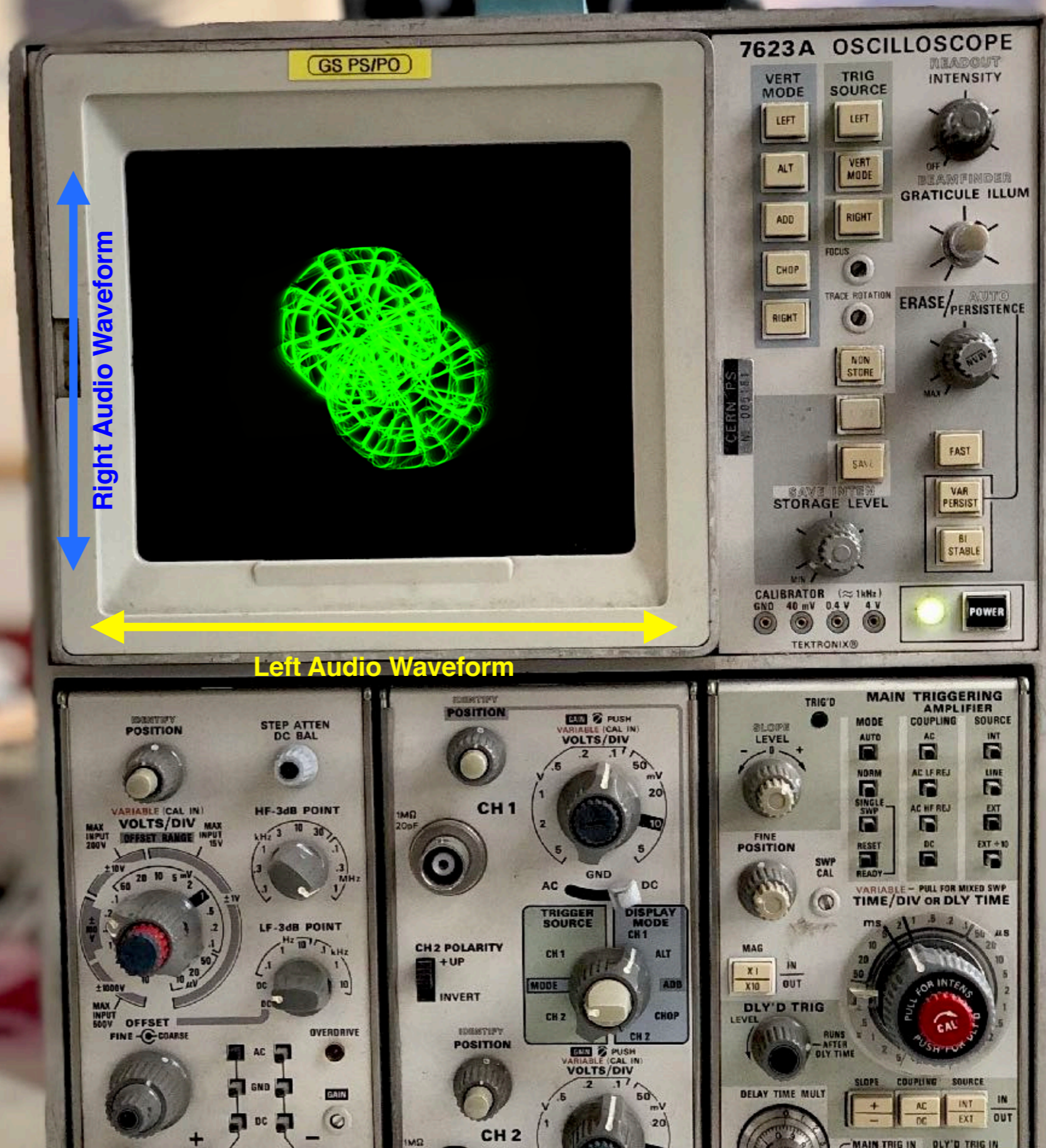
LHC SYNTHESIZERS



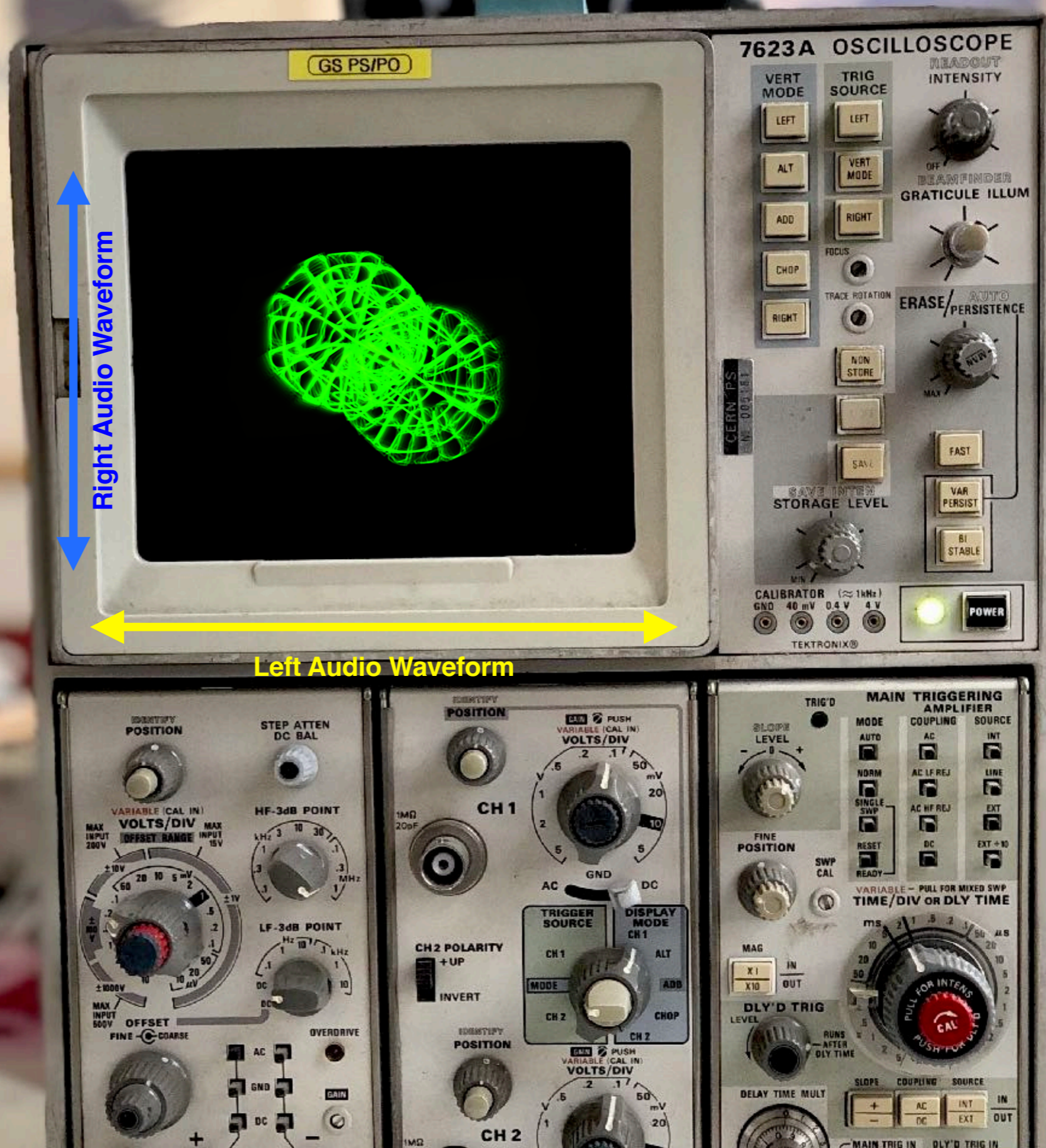
Right Audio Waveform

Left Audio Waveform

LHC SYNTHESIZERS



LHC SYNTHESIZERS

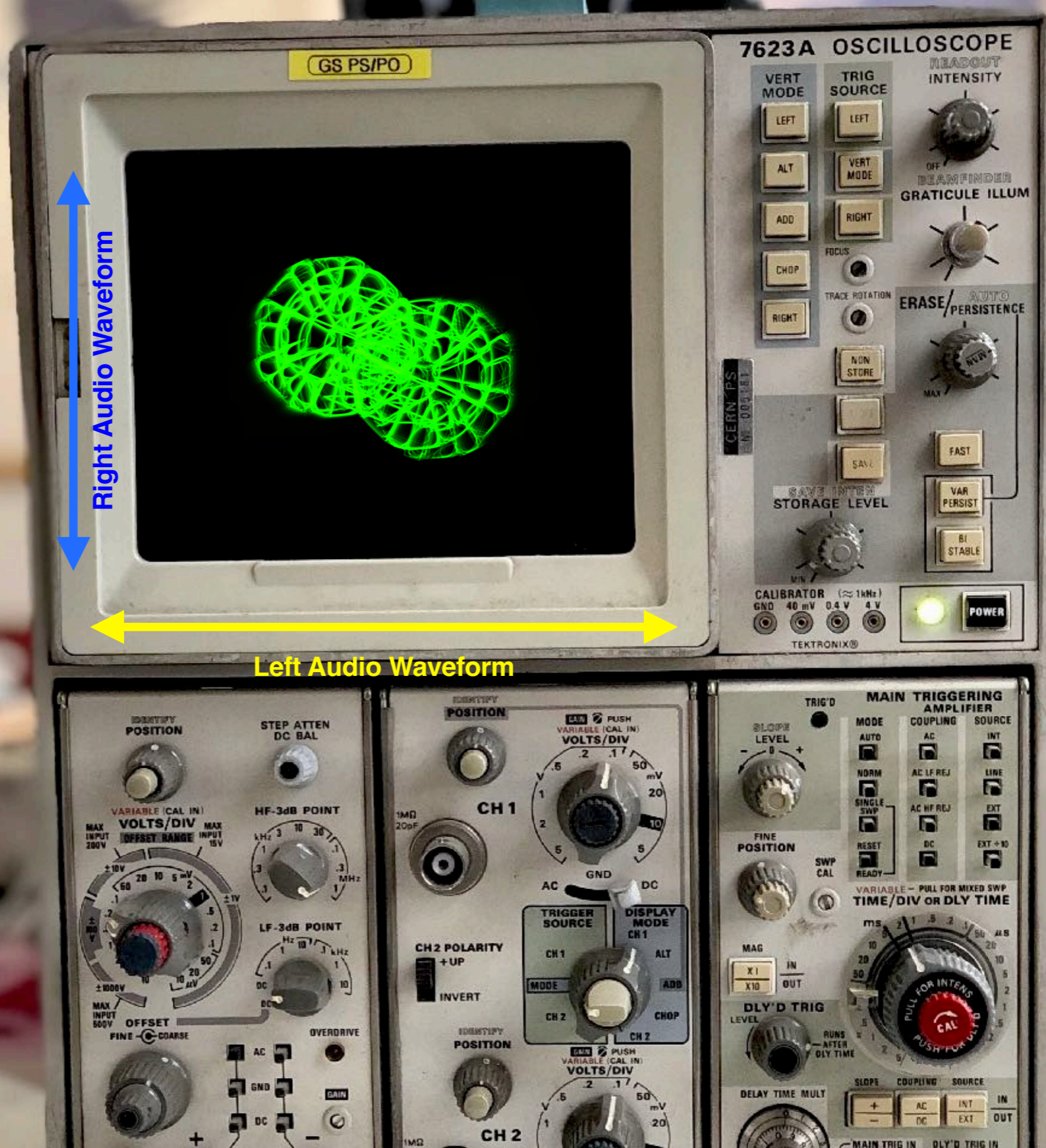


Right Audio Waveform

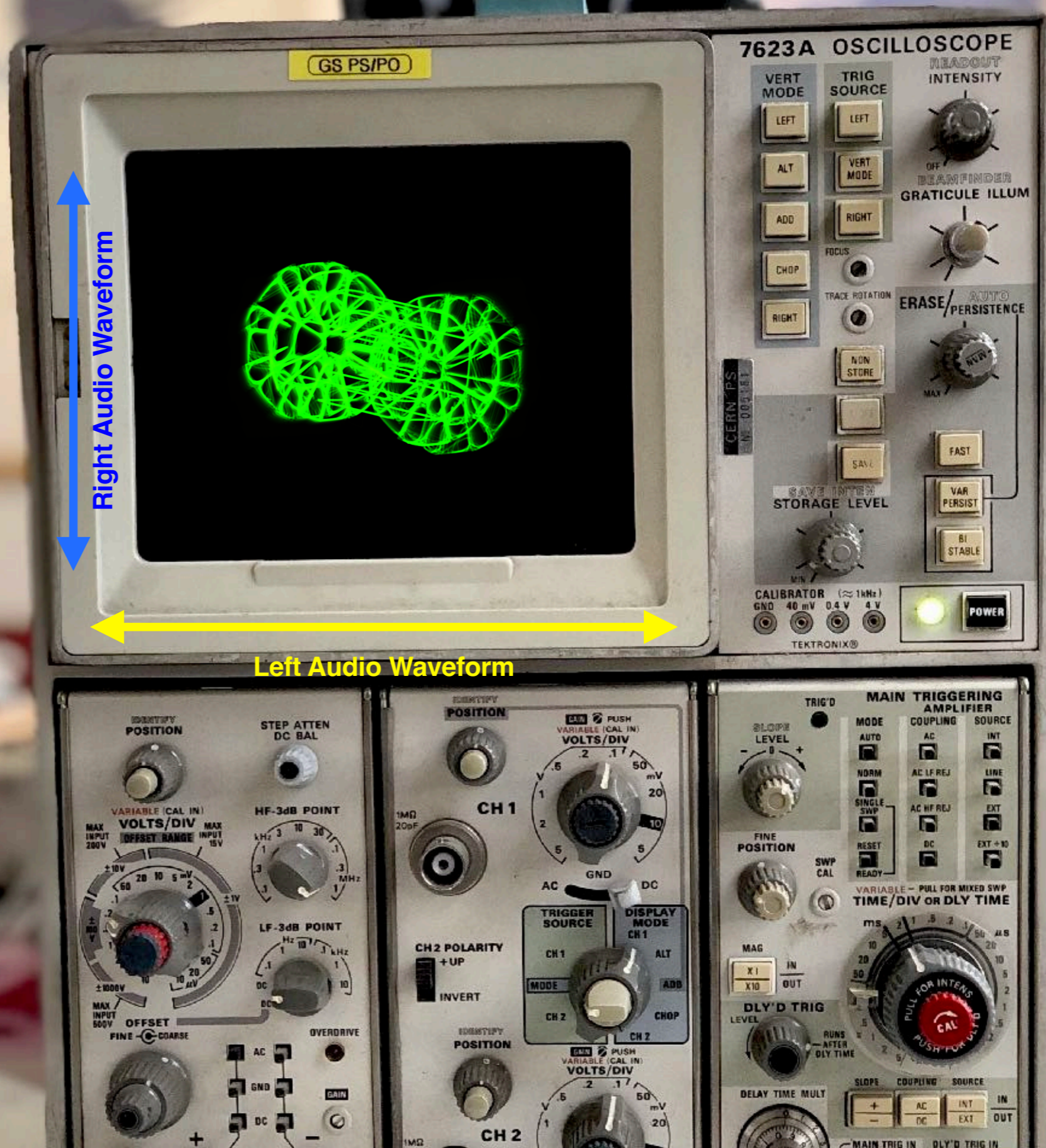
Left Audio Waveform

Left Audio Waveform

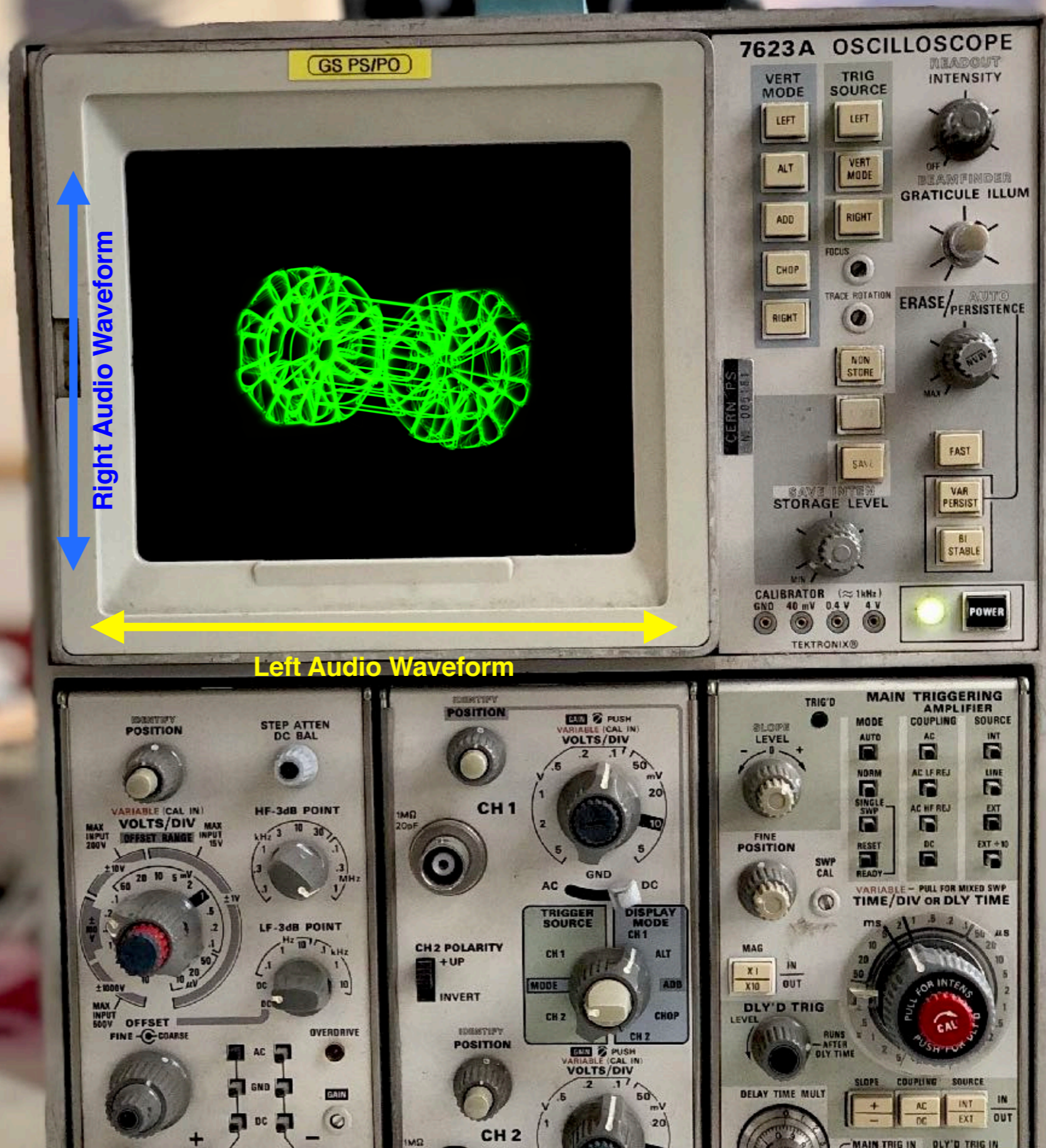
LHC SYNTHESIZERS



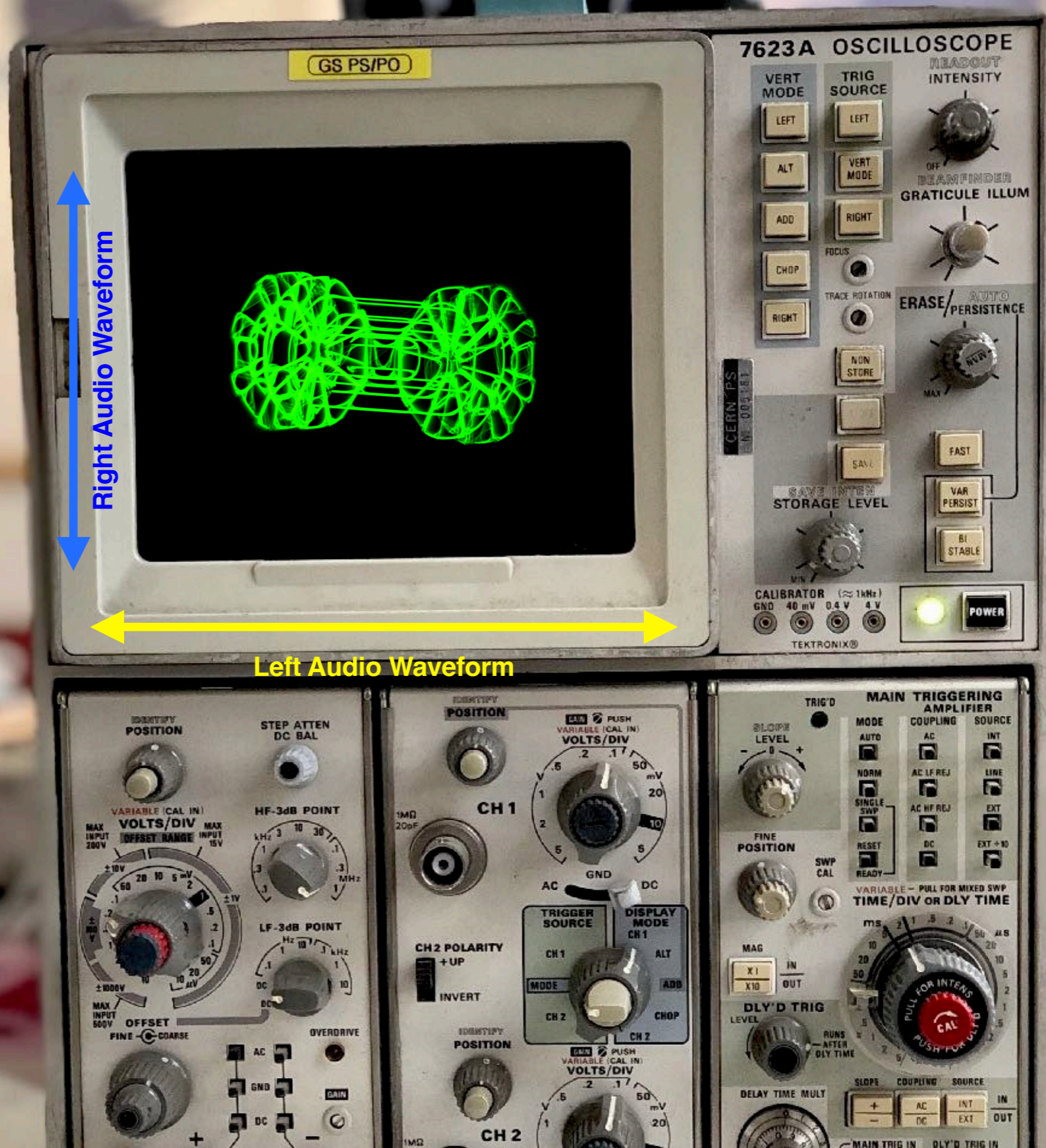
LHC SYNTHESIZERS



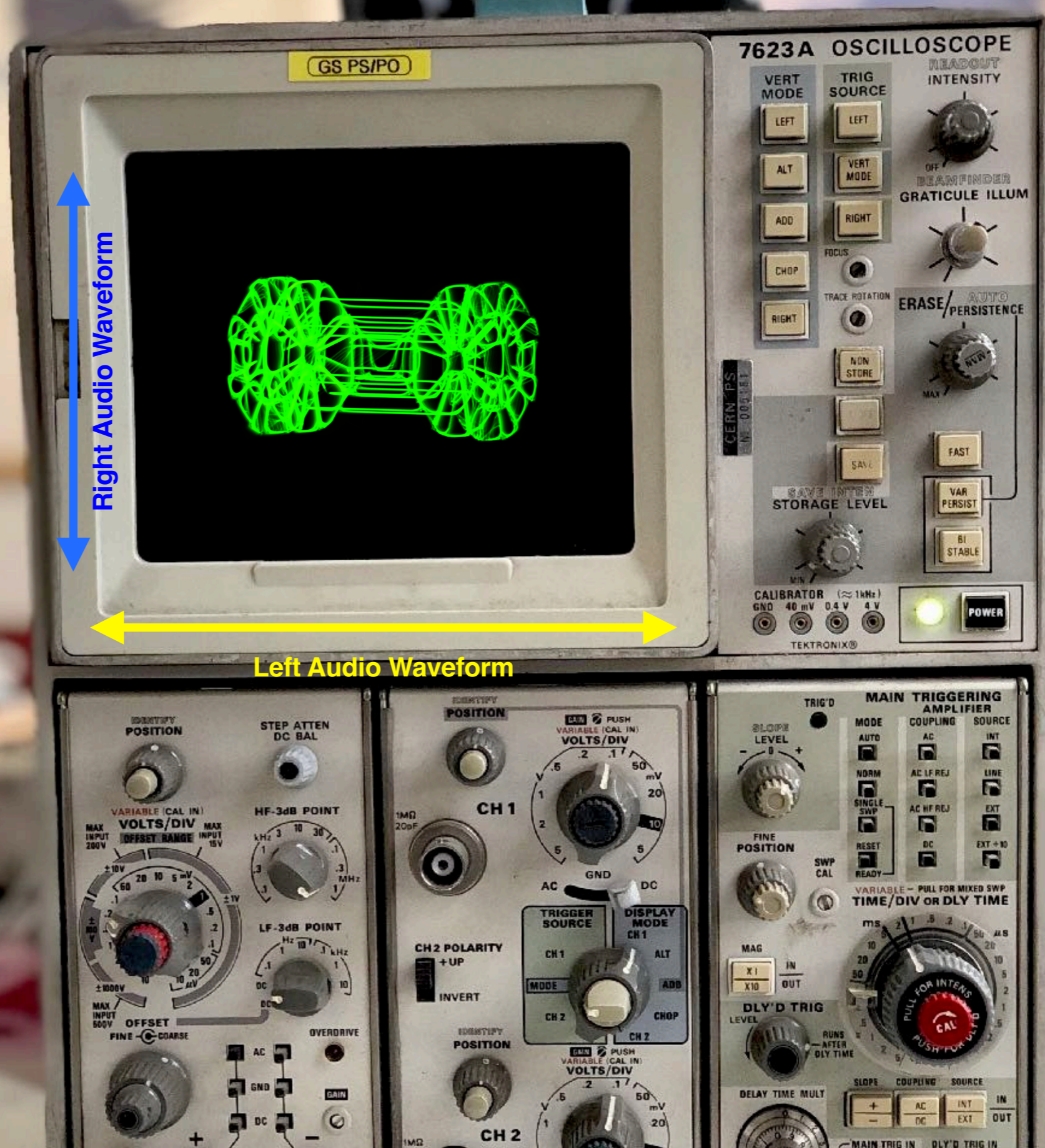
LHC SYNTHESIZERS



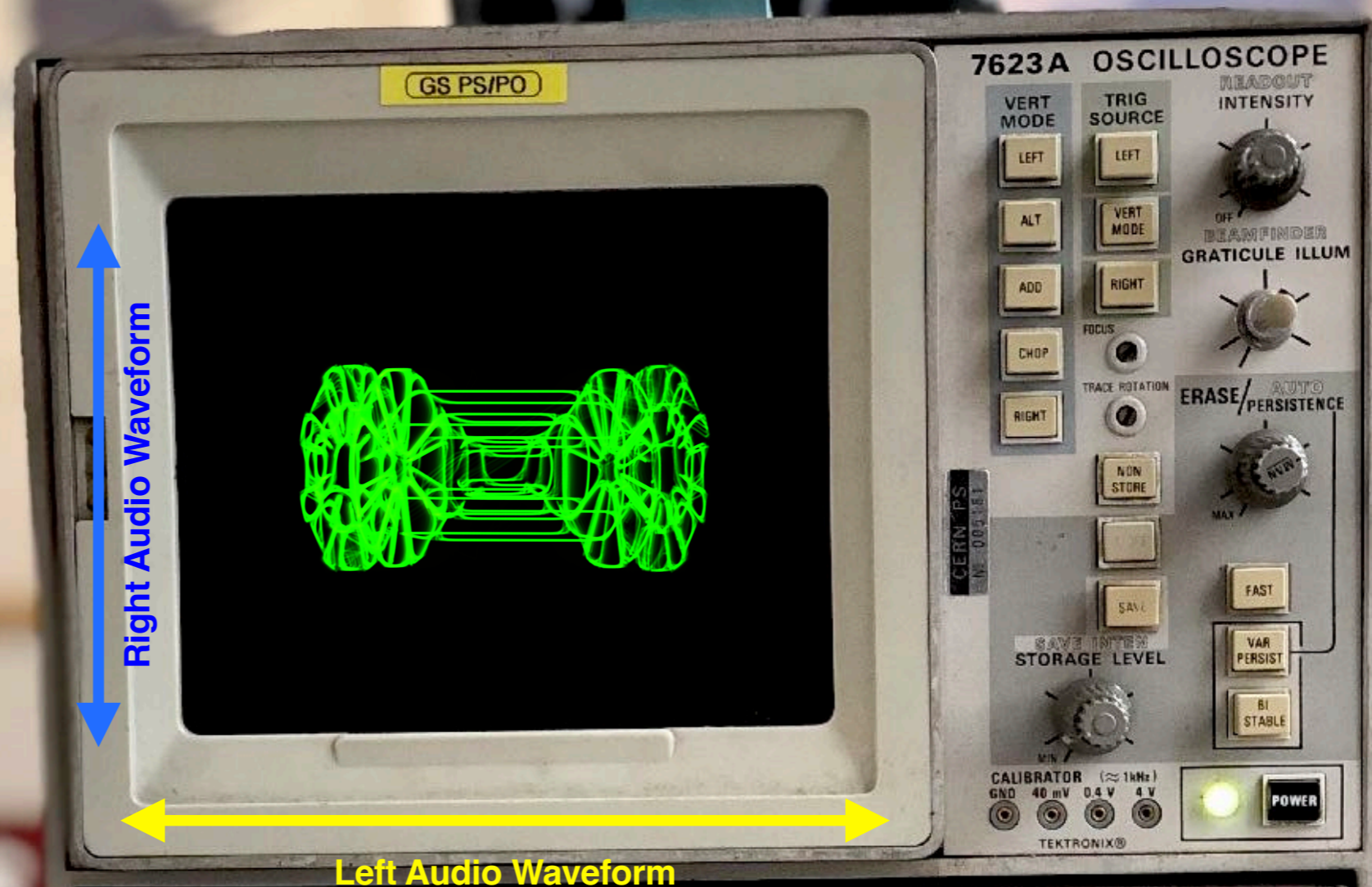
LHC SYNTHESIZERS



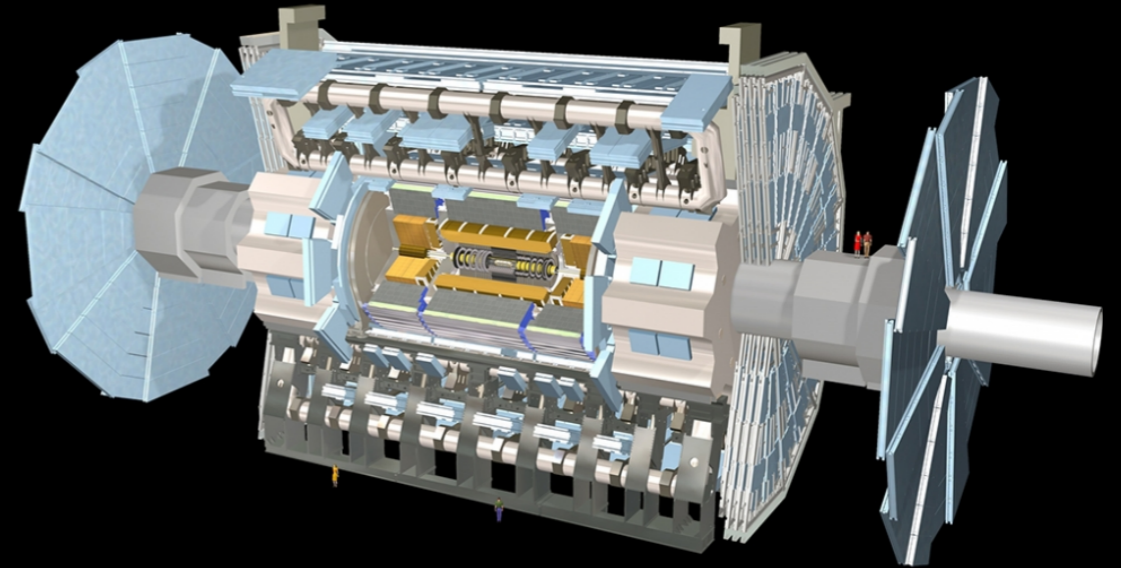
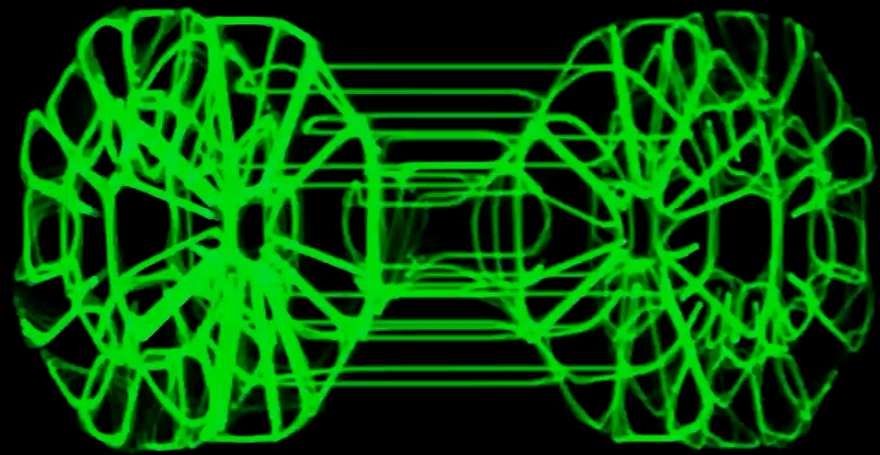
LHC SYNTHESIZERS



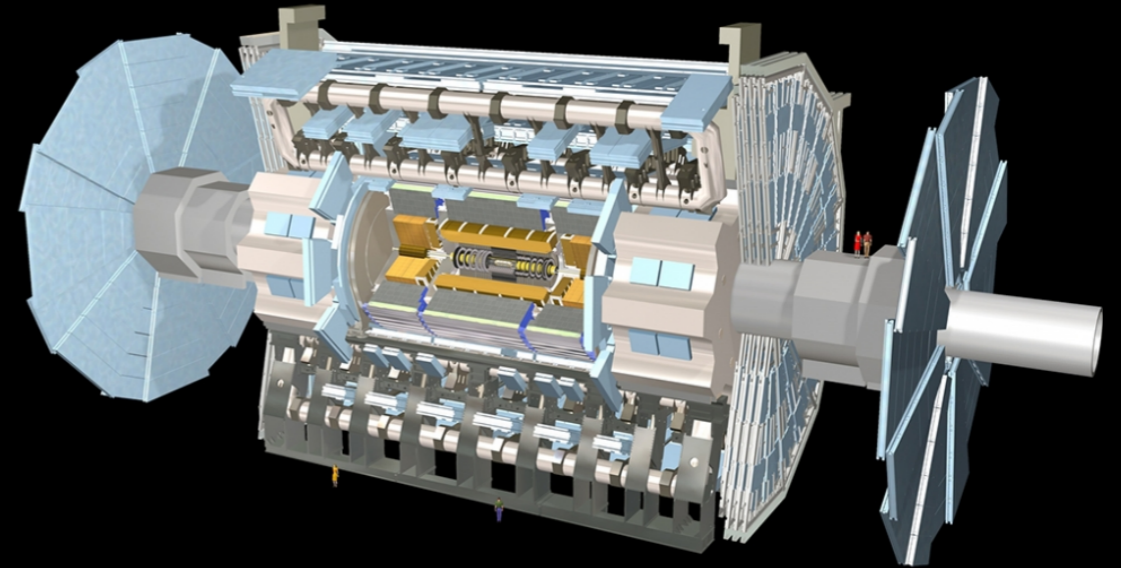
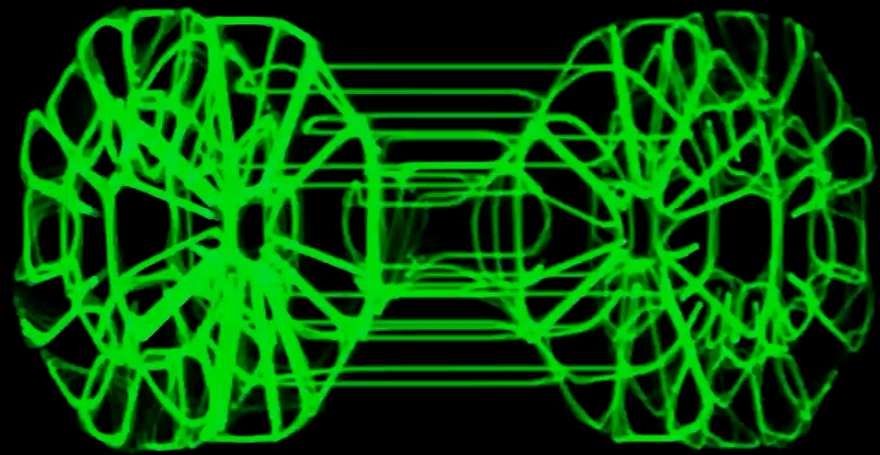
LHC SYNTHESIZERS



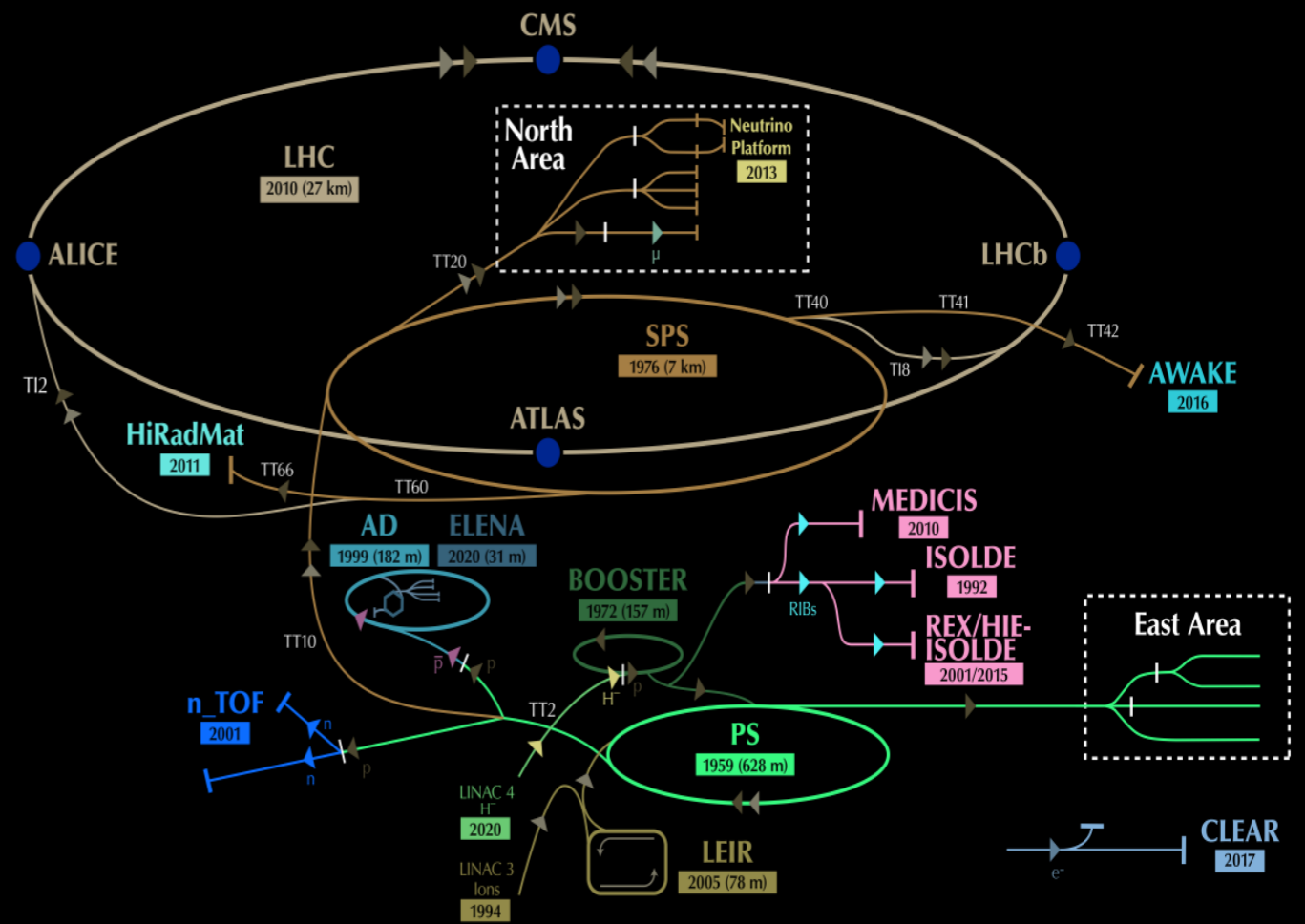
**ENGINEERING SOUNDS TO
DRAW LHC IMAGERY**



THE ATLAS EXPERIMENT



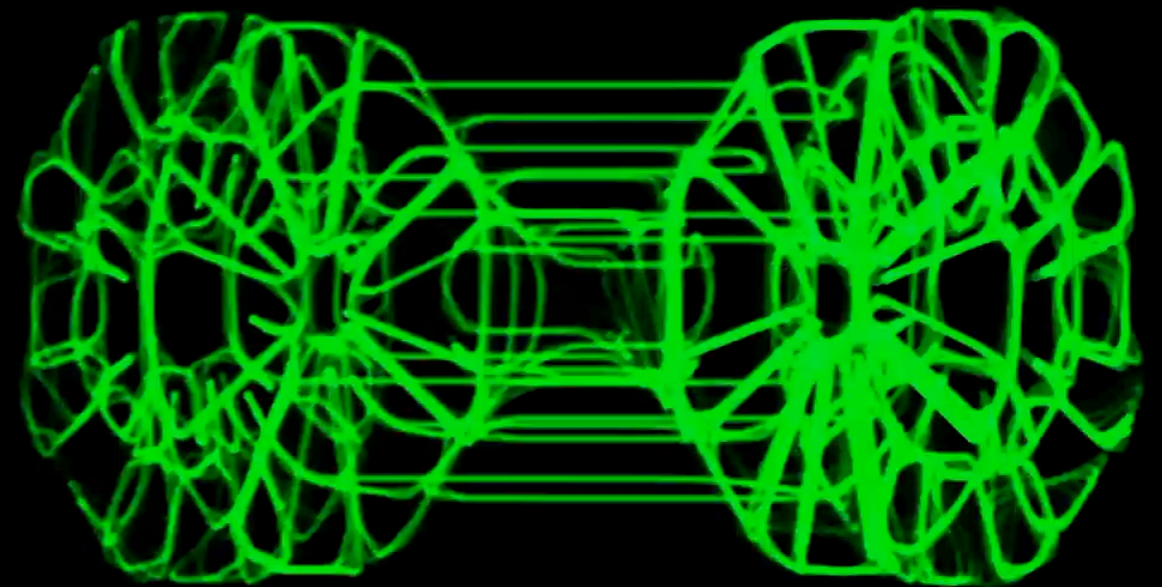
THE ATLAS EXPERIMENT



THE LHC COMPLEX

**CUSTOM SOFTWARE
SYNTHESIZERS AND 3D
MODELING SOFTWARE**

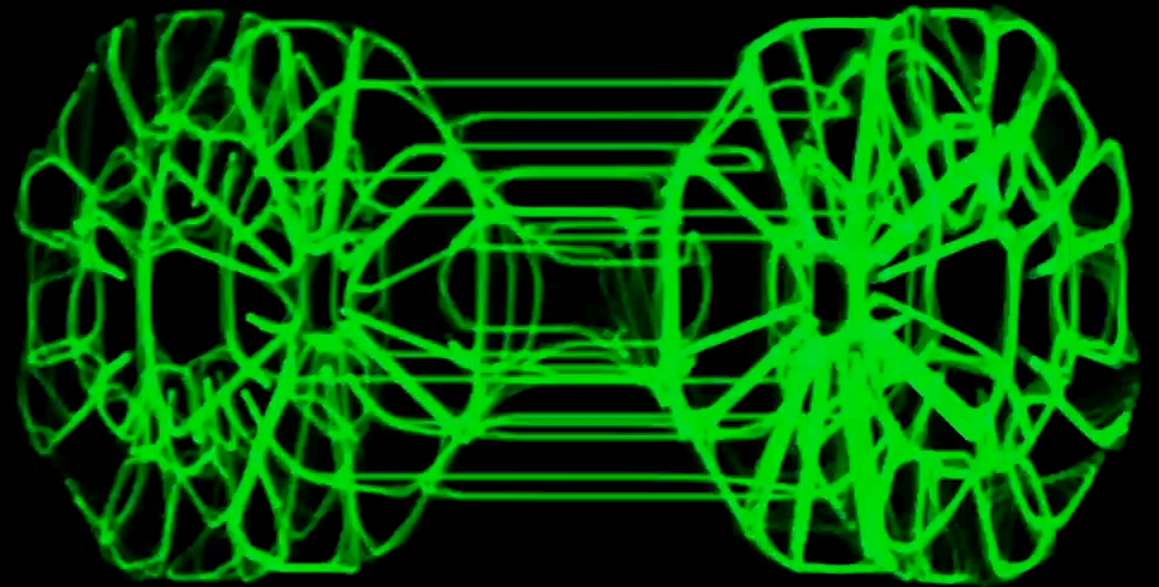
**ANIMATIONS IN
“LISSAJOUS SPACE”**



**SHAPE: TIMBRE
DRAWING FREQUENCY: PITCH**

**CUSTOM SOFTWARE
SYNTHESIZERS AND 3D
MODELING SOFTWARE**

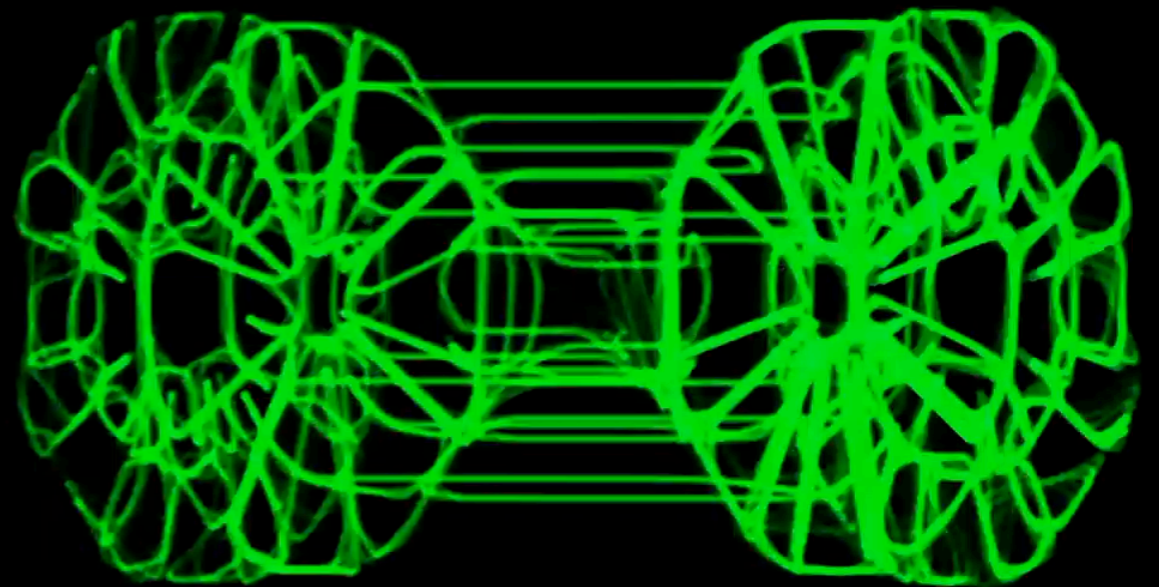
**ANIMATIONS IN
“LISSAJOUS SPACE”**



**SHAPE: TIMBRE
DRAWING FREQUENCY: PITCH**

**CUSTOM SOFTWARE
SYNTHESIZERS AND 3D
MODELING SOFTWARE**

**ANIMATIONS IN
“LISSAJOUS SPACE”**



**SHAPE: TIMBRE
DRAWING FREQUENCY: PITCH**

**USING THESE SOUNDS,
I MAKE MUSIC**



COLLIDERSCOPE

Particle Physics On The Dance Floor



[\[YouTube Link\]](#)



VIDEOS FOR YOUTUBE,
CONFERENCE PROMOS,
FESTIVAL PROMOS

PUT ON IMPROVISED LIVE
PERFORMANCES



The screenshot shows a YouTube channel page for 'ColliderScope'. At the top, there is a navigation bar with the YouTube logo, a search bar, and a 'Subscribed' button. Below the navigation bar are tabs for 'Home', 'Videos', 'Shorts', 'Playlists', 'Community', and 'Channels'. Under the 'Videos' tab, there are three filter buttons: 'Latest', 'Popular', and 'Oldest'. The main content area displays a grid of video thumbnails. Each thumbnail includes a video player preview, a title, and view/view date information. The first video is 'COLLIDERSCOPE // (Live in Seattle)' with a duration of 47:56 and 233 views from 1 year ago. The second is 'ICHEP 2020 :: COLLIDERSCOPE (Oscilloscope Music)' with a duration of 0:51 and 1.5K views from 3 years ago. The third is 'COLLIDERSCOPE // (Live in Lund, Sweden)' with a duration of 20:17 and 401 views from 3 years ago. The fourth is 'COLLIDERSCOPE // (Live at Aeronaut Brewery)' with a duration of 49:16 and 457 views from 3 years ago. The fifth video is partially visible and features 'HAPPY NEW YEAR' and 'ATLAS' text. The sixth video is partially visible and features 'PARTICLE PHYSICS' and 'LIVE IN' text. A large QR code is positioned in the top right corner of the screenshot, and the text '[YouTube Link]' is overlaid on the second video thumbnail.

[YouTube Link]

COLLIDERSCOPE // (Live in Seattle)
47:56
233 views · 1 year ago

ICHEP 2020 :: COLLIDERSCOPE (Oscilloscope Music)
0:51
1.5K views · 3 years ago

COLLIDERSCOPE // (Live in Lund, Sweden)
20:17
401 views · 3 years ago

COLLIDERSCOPE // (Live at Aeronaut Brewery)
49:16
457 views · 3 years ago

HAPPY NEW YEAR ATLAS

PARTICLE PHYSICS LIVE IN

VIDEOS FOR YOUTUBE,
CONFERENCE PROMOS,
FESTIVAL PROMOS

PUT ON IMPROVISED LIVE
PERFORMANCES

SURROUNDED BY
GLOWING SCOPES

A screenshot of a YouTube channel page for 'ColliderScope'. The page shows the channel's navigation menu (Home, Videos, Shorts, Playlists, Community, Channels) and a grid of video thumbnails. The videos are:

- COLLIDERSCOPE // (Live in Seattle)**: 233 views · 1 year ago, 47:56 duration.
- ICHEP 2020 :: COLLIDERSCOPE (Oscilloscope Music)**: 1.5K views · 3 years ago, 0:51 duration.
- COLLIDERSCOPE // (Live in Lund, Sweden)**: 401 views · 3 years ago, 20:17 duration.
- COLLIDERSCOPE // (Live at Aeronaut Brewery)**: 457 views · 3 years ago, 49:16 duration.
- HAPPY NEW YEAR ATLAS EXPERIMENT**: A video thumbnail for a New Year's greeting.
- PARTICLE PHYSICS LIVE IN**: A video thumbnail featuring particle physics equipment.

The channel name 'ColliderScope' is visible at the top of the page.

[YouTube Link]

COLLIDERSCOPE LIVE SHOWS ARE ABOUT:

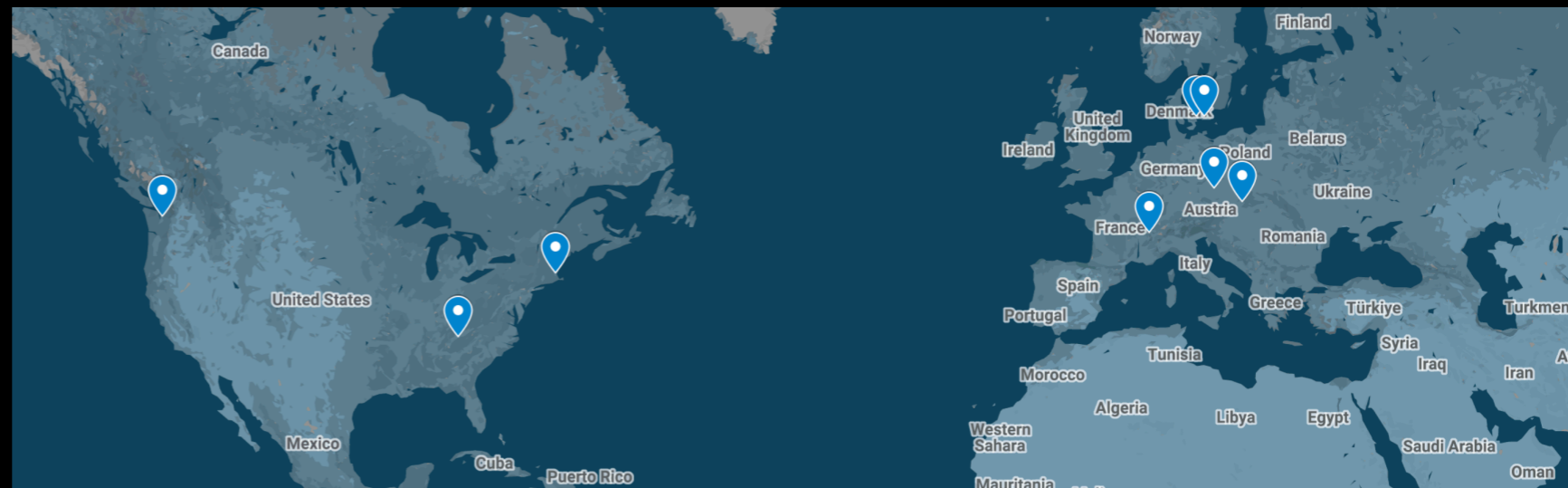
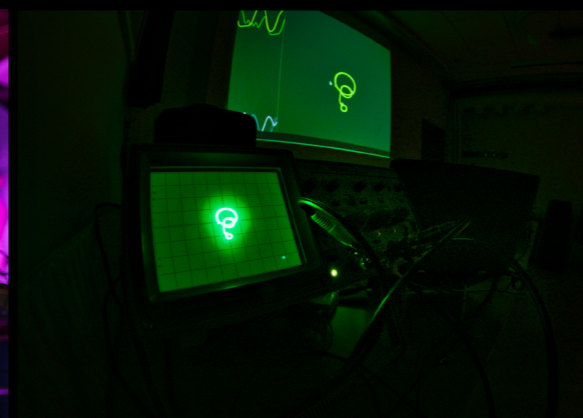
1) HAVING A GOOD TIME

2) MAYBE FINDING A PERSONAL CONNECTION BETWEEN MUSIC, ELECTRONICS, AND PARTICLE PHYSICS



[\[YouTube Link\]](#)





Live shows across the US and Europe

- Pohoda Festival (w/ CERN), Slovakia, 2019
- Roskilde Festival (w/ CERN), Denmark, 2022
- Clubs in Seattle, Boston, Prague
- Events in Knoxville, Geneva, Lund

w/ **Connie Potter**
and her amazing
**CERN Science
Pavilion Program**

MANY LEVELS

Super-geeks just love Fourier-hacked music



[\[YouTube Link\]](#)

MANY LEVELS

Super-geeks just love Fourier-hacked music



[\[YouTube Link\]](#)

Or you only understand that you're visualizing sound.
Intuitive sense for Fourier analysis w/o a name.

“

Round sounds ↔ Round shapes
Abrasive sounds ↔ Abrasive shapes

”

MANY LEVELS

Super-geeks just love Fourier-hacked music



[\[YouTube Link\]](#)

Or you only understand that you're visualizing sound.
Intuitive sense for Fourier analysis w/o a name.

“

Round sounds ↔ Round shapes
Abrasive sounds ↔ Abrasive shapes

”

Or maybe you're just looking to dance! Out at a bar with friends.
Never stepped foot in a physics classroom.

ColliderScope welcomes you in with the music you're looking for.

Might leave with a small new-found connection w/ physics

GEEKINESS

AGE

GEEKINESS

**GRADE SCHOOL
OUTREACH/
EDUCATION**

AGE

GEEKINESS

**GRADE SCHOOL
OUTREACH/
EDUCATION**

“PUBLIC OUTREACH”

AGE

GEEKINESS

**GRADE SCHOOL
OUTREACH/
EDUCATION**

“PUBLIC OUTREACH”

**WHO REACHES
(TAX-PAYING) ADULTS
THAT DON'T NATURALLY
SEEK OUT SCIENCE?**

AGE

**(OCTOBER)
WEEKEND
JOB?**

QUANTUM CANVASES

PHYSICS, THE ARTS,
AND THE HUMANITIES



Thursday Oct 19 @ 7:30pm

HARMONIC MOTION: PHYSICS X ELECTRONIC MUSIC

Performances by Physicists
ColliderScope, Superposition,
Science & Reason (DJ Set)

OCPAC @ 111 State St.

Sunday Oct 22

WRITER LUCY CALDWELL ON HER COLLABORATION WITH THE PHYSICS LABORATORY CERN

5pm: Reading at Union Ave Books

6pm: Meet and Greet & Book
Signing @ Knox Brewhub

Monday Oct 23 @ 1:30pm

SCIENCE FICTION AND PHYSICS IN CONVERSATION

Panel and Q&A w/ physicists from
CERN and UT, writers, and the
editors of a new collection of
physics-inspired short stories

UT Student Union
Room 169
1502 Cumberland Ave.

Monday Oct 23 @ 3pm

UT PHYSICS COLLOQUIUM

Physicist Rob Appleby on the
upgrade to the Large Hadron
Collider at CERN

UT Science and Engineering
Research Facility
Room 307
1414 Circle Dr.

ALL EVENTS ARE FREE AND OPEN TO THE PUBLIC
Organized by the Department of Physics & Astronomy and the UT Humanities Center

FOR MORE
INFORMATION:



tiny.utk.edu/physicsevents



THE UNIVERSITY OF
TENNESSEE
KNOXVILLE

DEPARTMENT OF
PHYSICS & ASTRONOMY

HUMANITIES CENTER

- Quantum Canvases: Physics, The Arts, and The Humanities
 - Oct 19-23
 - w/ UT Humanities Center, CERN, and local partners
- **Electronic Music Night**
- **Dialog on Science Fiction between Physics, Humanities, and the Public**

Harmonic Motion: Physics x Electronic Music



Prof Rob Appleby, Manchester, Accelerator Physicist
Superposition

I get ψ
with a little help
from my friends



Prof Steve Johnston, University of Tennessee, Knoxville, CM Theorist
Science & Reason



LL, University of Tennessee, Knoxville, HEP Experimentalist
ColliderScope

Harmonic Motion: Physics x Electronic Music

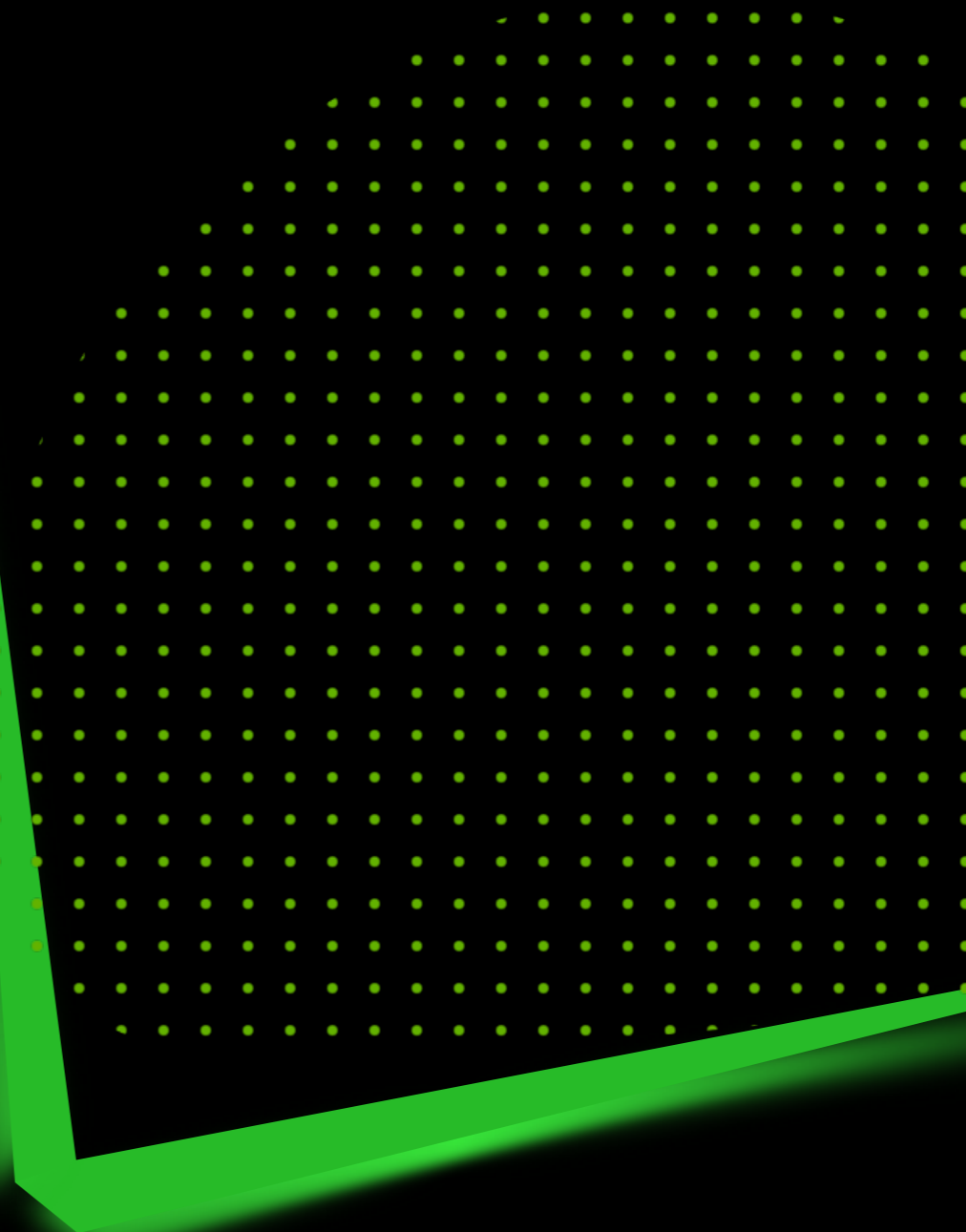
Dance floor
celebration of
physics



**LOTS OF
DIRECTIONS**

**COMMON THEME:
COMMUNICATE OUR
SCIENCE WITH THE
ENTIRE PUBLIC**

**NOT JUST THE SELF-
PROCLAIMED NERDS**



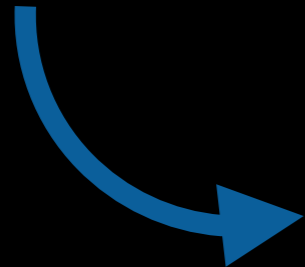
Educate 

OUR RESEARCH

**WATERED-DOWN
VERSION FOR
PUBLIC**

Science

Public



Educate

Excite

OUR RESEARCH

POP CULTURE

WATERED-DOWN
VERSION FOR
PUBLIC

SCIENCE-
INJECTED
CULTURE

Science

Public

**GEEK CULTURE WILL SEEK
OUT SCIENCE**

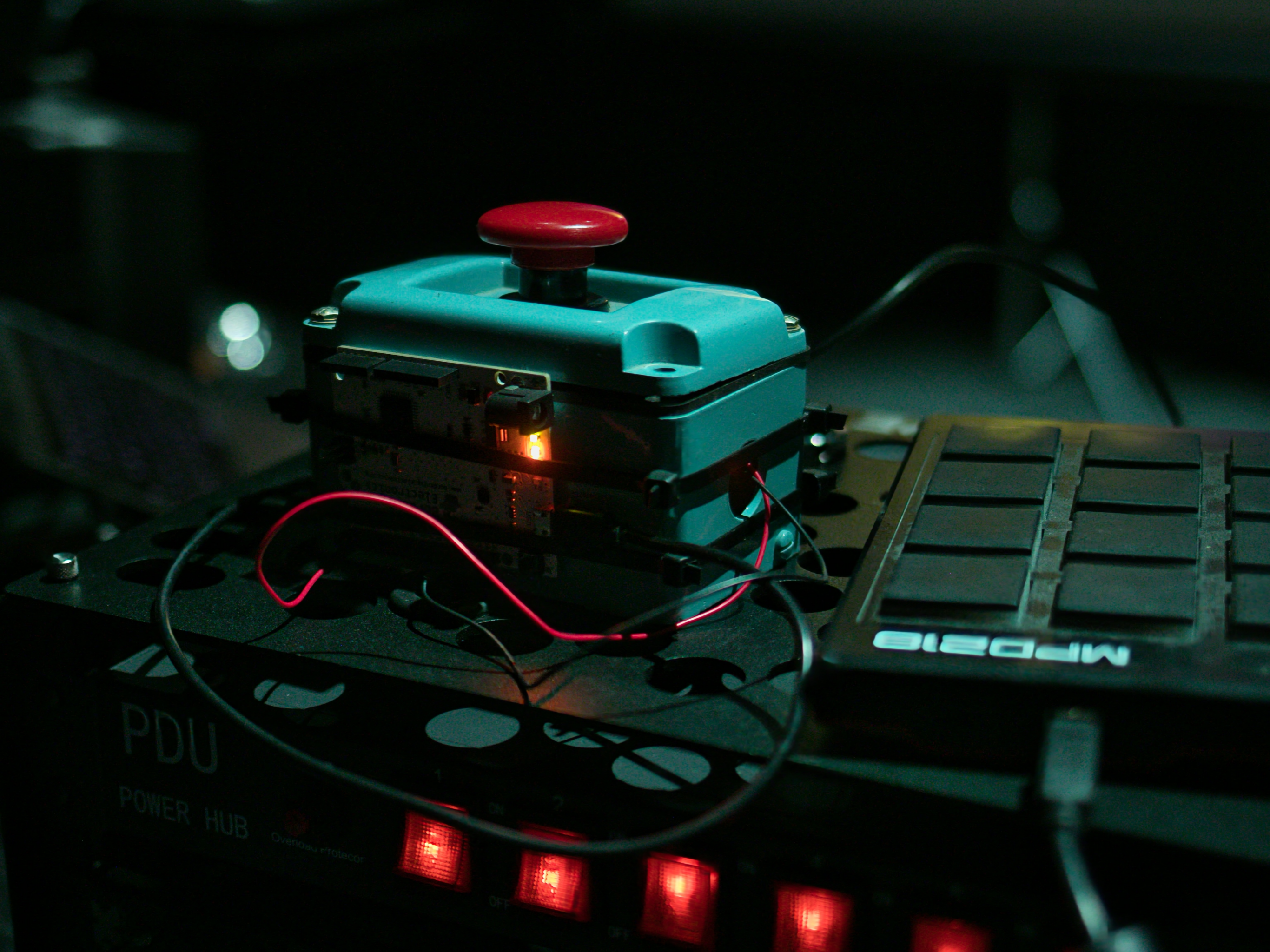
**WHEN WE “REACH OUT”,
LET’S NOT FORGET THOSE THAT DON’T**



Go to cern.ch/Larry and cern.ch/ColliderScope for more info
Get in touch if you want to throw a physics rave.

This work has been supported by the National Science Foundation, under Award No. 2235028





Red knob

Orange light

PDU

POWER HUB

Overload protector

ON

OFF

OFF

MEDIA

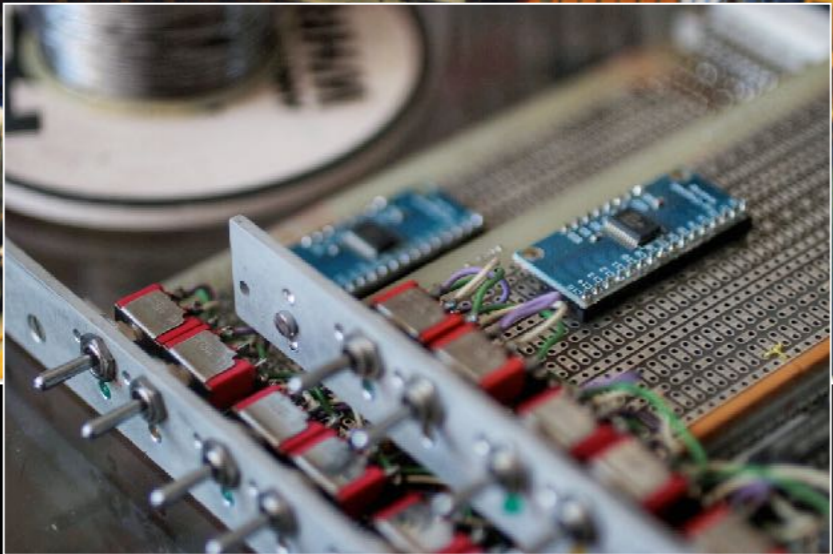
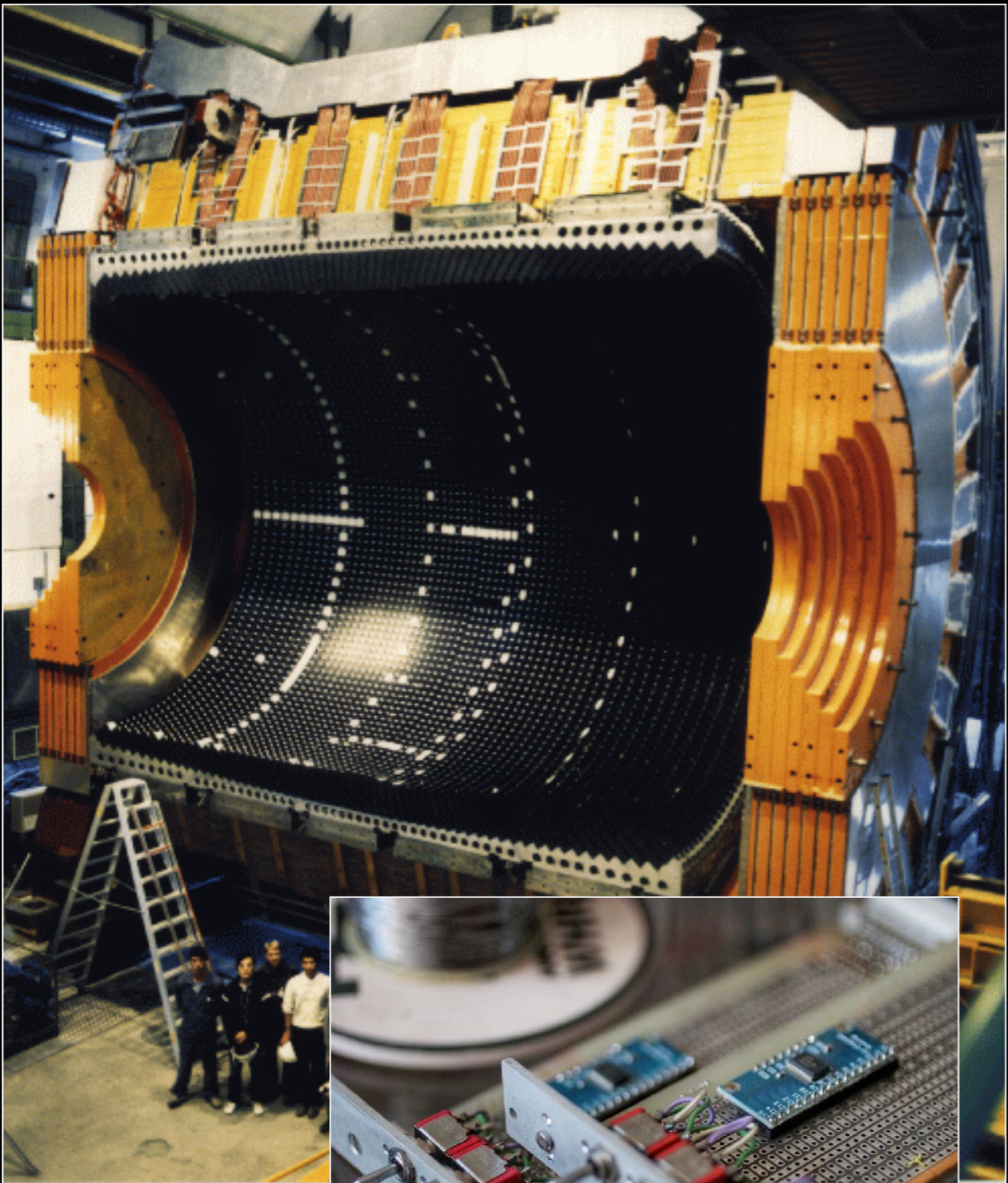
Electronic(s) Music

Make live music with repurposed electronics from old experiments

Brings us full circle back to the electronics of particle physics



LV Control Panel for UA1 Muon System



NIM Power Supply
from SSCL

VME Switch Array
from OPAL



- Events around a new collection of short stories
- Paired fiction authors with CERN physicists
- Events to connect with public
- **And** connect with the humanities
 - Reaching across the academy to have high level conversations, partnerships, collaborations
 - Truly interdisciplinary work!

