ADVANCED LIGHT SOURCE
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Today’s Questions

1. What is a synchrotron light source?
2. How do researchers use the ALS?
3. What discoveries have come out of the ALS?
Advanced Light Source

Today’s Stops

1. Accelerator
Advanced Light Source

Today’s Stops

2. Beamlines
What is a synchrotron light source?

1940s - cyclotron

2020 - synchrotron
US DOE ring-based light sources

Advanced Light Source

Stanford Synchrotron Radiation Lightsources

Advanced Photon Source

National Synchrotron Light Source-II
What is a synchrotron light source?

How many beamlines do you think the ALS has?
• 10
• 15
• 20
• 30
• 40
• 60
• 80

• X-ray light
• Infrared light
• Ultraviolet light
What is a synchrotron light source?
How do researchers use the ALS?

• What elements are in these dinosaur bones?
How do researchers use the ALS?

- What elements are in these dinosaur bones?
- What are the lithium ions doing in my battery?
How do researchers use the ALS?

- What elements are in these dinosaur bones?
- What are the lithium ions doing in my battery?
- What’s the shape of this mystery protein?
How do researchers use the ALS?

• What elements are in these dinosaur bones?
• What are the lithium ions doing in my battery?
• What’s the shape of this mystery protein?
• What’s the best design for the tiny chip in my smartphone?
How do researchers use the ALS?

Beamline 4.0.3
How do researchers use the ALS?

Beamline 4.2.2
Structural biology in the fight against COVID
Structural biology in the fight against COVID

2003: SARS-CoV
2019: SARS-CoV-2
How do researchers Use the ALS?

Beamline 11.3.2
What discoveries have come out of the ALS?

What do you want to learn about?

1. Clues to the early solar system
2. Dinosaur tissues
3. Cheaper batteries
4. Red tides
5. Wine and water
6. Skin cancer treatment
Clues to the early solar system preserved in a meteorite
Clues to the early solar system preserved in a meteorite
Soft tissue preserved in *T. rex* bone
Higher-energy, lower-cost batteries
A bullfrog’s defense against toxic red tides
A bullfrog’s defense against toxic red tides
Wine, water, and x-ray tomography
Wine, water, and x-ray tomography
Drug development to stop malignant melanoma
Drug development to stop malignant melanoma
Team science

See for yourself: als.lbl.gov