

Links to Supplementary Resources

LAAAMP & CLS Teachers’ Workshop 2021

Updated: June 25, 2021

Like any good research journey, there is a lot of reviewing literature along the way! Here you will find a running table of resources we would like to share with you, as some directly relate to our sessions during the workshop week and can help supplement your understanding of the content (you are welcome to share these resources with your students). The resources are listed alphabetically in each table. If you do not find what you are looking for, feel free to reach out to us.

Additionally, if you have a **resource worth sharing**, please send it to the Education Team (email at end)! We encourage the opportunity to collaborate and connect, even beyond the Teachers’ Workshop. This document will be updated after the workshop ends and sent out to you, along with links to our recorded sessions. Don’t forget to check out our [Virtual Classroom](#) as we look to upload new resources there!

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Engage with CLS

Social Media



[@EducationCLS](#)



[CLS YouTube Channel](#)

Monday Session #1 - Introductions

Title [Format]	Description	Link/Location
The ALBA Synchrotron [Video]	An introductory video explaining the science behind the ALBA synchrotron located near Barcelona, Spain.	https://www.youtube.com/watch?v=3gW48fRPXIY
The LNLS Synchrotron [Video]	An interview describing the Laboratório Nacional de Luz Síncrotron, a synchrotron located in Sao Paulo, Brazil.	http://www.youtube.com/watch?v=S_ex96fFFss
Le Synchrotron SOLEIL Dessin animé [Comic/Educational Resource]	A French-language comic outlining how the SOLEIL synchrotron works.	https://bit.ly/3mvx4i7
Videos from SOLEIL Synchrotron [Videos]	A collection of videos from the SOLEIL synchrotron providing information on the science and staff of the facility.	https://www.synchrotron-soleil.fr/en/videos
Why we let youth play with one of Canada's biggest science facilities Seminar [Video]	Tracy Walker, the CLS Education Program Lead, leads a discussion about the benefits and reasons of letting youth use the synchrotron facility.	http://youtu.be/e_jnTQOZPuI
Advanced Light Sources and Crystallography: Tools of Discovery and Innovation [Web page]	Shared by Sekazi, LAAAMP has an info brochure in various languages that describes light sources and the crystallography technique.	https://laaamp.iucr.org/tasks/brochure
Welcome from LAAAMP [PowerPoint]	A presentation from LAAAMP to act as an introduction to the workshop and the organization.	https://drive.google.com/file/d/1zZITkUwFeajpiB800A_HYtyM3_seiVrW/view?usp=sharing
Welcome from the CLS [PowerPoint]	An introduction to the workshop from the CLS education team.	https://drive.google.com/file/d/1wdQcgmlSgqtY5EuBNIPy5MukVMSOHIMR/view?usp=sharing

Monday Session #2 – Weaving Ways of Knowing

Title [Format]	Description	Link/Location
Etuaptomuk: Two-Eyed Seeing Rebecca Thomas Presentation [Video]	A TEDx Talk which describes ‘Two-eyed seeing’, a method to bring together western and Indigenous thinking.	http://www.youtube.com/watch?v=bA9EwcFbVfg
Indigenous Connections [Web page]	A collection of Indigenous resources and content from the CLS Education team.	https://sites.google.com/lightsource.ca/virtualclassroom/indigenous-connections
Panelist Corey Gray [Web Page]	(1) Bio on California State University web site. (2) News article featuring gravitational waves and Blackfoot language connections	(1) https://www2.calstate.edu/impact-of-the-csu/alumni/made-in-the-csu/humboldt/Pages/corey-gray.aspx (2) https://woc.aises.org/content/corey-gray-siksika-nation-blackfoot-laser-interferometer-gravitational-wave-observatory-ligo
Panelist Janice Osecap [web page]	University news article on success of STEM accelerator program for Indigenous students	https://news.usask.ca/articles/colleges/2021/the-environment-is-supportive-and-constant-usask-students-praise-isap,-stem-accelerator-courses.php
Panelist Julia Doucette-Garr [web page]	University news article on Mentor STEP for Indigenous women in science.	https://news.usask.ca/articles/research/2020/a-world-of-difference-shining-a-light-on-indigenous-women-in-science.php
CLS Summer Students [Newsletter Article]	An article highlighting the work of two of our Indigenous summer students at the CLS.	https://sites.google.com/lightsource.ca/virtualclassroom/about/whats-happening

Tuesday Session #1 – Virtual Tour

Title [Format]	Description	Link/Location
Introduction to the Canadian Light Source STEM Seminar with Robert Blyth [Video]	In this seminar, Dr. Robert Blyth provides an overview of what the synchrotron is, an in-depth tour of the inside of the building, and how light is used to conduct research at the CLS.	https://www.youtube.com/watch?v=0eqfDJDcIn4
Supporting Excellence in Research at the Canadian Light Source Synchrotron Webinar [Video]	A webinar featuring CLS Science Director Dr. Gianluigi Botton who highlights the research, beamline capabilities and outcomes of the CLS.	https://www.youtube.com/watch?v=mjNpKTN2CjI
Synchrotron Explained [Web page]	An interactive exploration of the CLS facility with a collection of resources, videos, and lessons.	https://sites.google.com/lightsource.ca/virtualclassroom/student-exploration/synchrotron-explained
CLS Virtual Tour [Interactive Tour]	A virtual tour of the CLS facility including information on CLS science, mechanical equipment, and fun facts!	https://www.lightsource.ca/tours

Tuesday Session #2 – Connections to Physics

Title [Format]	Description	Link/Location
A Cyclotron Is... [Comic/Educational Resource]	A comic providing different perspectives on what a cyclotron is.	https://bit.ly/37roxbu
The Electromagnetic Spectrum (From a Teacher Perspective) [Video]	A teacher's perspective of the electromagnetic spectrum and how it is used at the CLS, as well as how teachers can incorporate it into their classrooms.	https://www.youtube.com/watch?v=1m7g-Ny5wtA
How Does It All Work? [Slideshow]	A summary of the IDEAS Beamline at the CLS detailing the components and the processes used by the beamline scientists.	https://bit.ly/35fprW8
How a Synchrotron Works [Video]	A short video describing how a synchrotron works.	https://www.youtube.com/watch?v=nuJnJqq9LXM
Inside the Synchrotron [Web page]	A more detailed look at the components of the synchrotron and the science behind each of those parts.	https://www.lightsource.ca/inside_the_synchrotron
CLS Machine Information [Web page]	The various synchrotron machine parameters of the CLS.	https://www.lightsource.ca/machine.html
Science with a Synchrotron [Slideshow]	A student-created resource which outlines how a synchrotron works, why its used, and connections to various physics concepts!	https://bit.ly/3fVqj8O

List of Classroom Resources & Activities

Check out our collection of lesson plans, activities, and resources that are based around the CLS, synchrotron science, and synchrotron research!

- <https://sites.google.com/lightsource.ca/virtualclassroom-for-educators/educational-resources>

Wednesday Session #1 – IDEAS Beamline

Title [Format]	Description	Link/Location
IDEAS Beamline Tour [Video]	A guided tour of the optical and experimental enclosures of the IDEAS beamline at the CLS.	http://www.youtube.com/watch?v=AHvIH6i9ou0&t
IDEAS XRF Summary Sheet [Educational Resource]	A quick cheat sheet that lists the common heavy metal elements present in samples. .	https://bit.ly/3o7djiB
Laboratory Notebook Guide [Educational Resource]	Learn what goes into a lab notebook or log book, how to organize it, and what best practices are.	https://bit.ly/35h3SV8
Soil Learning Module [Unit Plan]	A learning module for the CLS Education TREE Program focusing on soil, soil horizons, and the nutrient web.	https://confluence.lightsource.ca/display/TTP/Module+3+-+Soil
XRF Animated with the IDEAS Beamline [Slideshow]	Look at the process of XRF in this animation slides. Feel free to download these slides and present them.	https://drive.google.com/file/d/1yaOW6kRyZZTMOB2bVeyjfhrKu7-6M5Tb/view?usp=sharing

Wednesday Session #2 – Understanding Data

Title [Format]	Description	Link/Location
Excelling, With Synchrotron Data [Video]	An informational video providing some tips and tricks for getting data into spreadsheets.	https://www.youtube.com/watch?v=hVvBFGHIU30
Plotting Data with Excel [Video playlist]	A series of CLS-made videos detailing how to plot and manipulate data in Excel.	https://www.youtube.com/playlist?list=P Lj5uIatsoSLdR_9C_ZU4DQeoPGUvvlGxE
X-rays and Soil Science STEM Seminar with Dr. Adam Gillespie [Video]	A STEM seminar from Dr. Adam Gillespie focusing on his research on soil and how synchrotrons can provide useful information.	https://www.youtube.com/watch?v=H8unGXuI9DA

Thursday Session #1 – Research Story

Title [Format]	Description	Link/Location
Animation of Crystallography Experimental Data [Video]	An animation of data collected from a thaumatin sample collected in the CMCF beamline at the CLS.	http://youtu.be/XvkrkWkd6XI
What is Crystallography and the CMCF Beamline? [Web page]	A link to the Canadian Macromolecular Crystallography Facility (CMCF) website which provides an overview of crystallography and the facility itself.	https://cmcf.lightsource.ca/about-cmcf/
10 Years of Discovery with Michel Fodje [Video]	Michel Fodje, Staff Scientist at the CMCF, highlights the importance of using the synchrotron to find out the structure of disease, virus, and the building blocks of life.	https://www.youtube.com/watch?v=Ir_Yj4PameM
DNA Animations [Video]	A collection of animations of DNA for a science & art exhibition.	https://www.youtube.com/watch?v=7Hk9jct2ozY
Animation of Electron Transport Chain [Video]	An excerpt from a HarvardX cell biology course containing animations of electron transport chains and mitochondrial diseases.	https://www.youtube.com/watch?v=LQmTKxI4Wn4
What is a Protein? [Video]	An informative animation and overview of proteins, amino acids, and data representation created by the RCSB Protein Data Bank.	https://www.youtube.com/watch?v=wwTv8TqWC48 Spanish: https://www.youtube.com/watch?v=wZVWnHOVPuw

Thursday Session #2 – Curricular Connections

Title [Format]	Description	Link/Location
CLS News [Web page]	A database of CLS research-related news that shows what is happening in science today.	https://www.lightsource.ca/news.html
CMCF Research Highlights [Web page]	A compilation of CLS research highlights from the CMCF.	https://cmcf.lightsource.ca/news/category/research-highlights/
<u>CLS Education Resources</u>		
Accelerating Matter	This activity uses magnetic force to accelerate a ball bearing. It parallels can be drawn to CLS to help demonstrate similar concepts.	https://bit.ly/3kileHh
Building a Monochromator	A monochromator is the device that enables scientists to select specific wavelengths of light for their experiments. Using a prism, students will explore the properties of light and the spectrum within a practical context.	https://bit.ly/34dKnNU
Light and Optics Lesson	Done from Kindergarten to Grade 12! The lesson demonstrates diffraction, scattering, reflection, and photoluminescence with a tub of water and lasers.	English: https://bit.ly/37suo0u French: https://bit.ly/34fbQOZ
Location Discussion	The premise of this lesson is based on decision making. Students must determine if the location of building a synchrotron is appropriate.	https://bit.ly/3m7AUh0
Making a Scientific Poster Resources	Part of any researcher's journey is sharing their experience and their findings to the scientific community.	https://sites.google.com/lightsource.ca/virtualclassroom/student-exploration/scientific-posters
Research Proposal	In this resource, students are encouraged to write their own research proposal based on a topic of their choosing. This will get them thinking about what is all involved.	https://bit.ly/34gDIT9
Women in Science Videos	This resource is a collection of CLS YouTube videos that capture some of the many inspiring women who have passed through our doors.	https://www.youtube.com/playlist?list=PLj5uIatsoSLdEZBf4Qz1r-a8B7S98a_L6

Friday Session – Approaches & Strategies

Title [Format]	Description	Link/Location
CLS Education Program Info [Web pages]	Web pages on the main CLS website that go over the various Education programs and how you can get involved.	https://www.lightsource.ca/education.html
CLS Education Virtual Classroom [Website]	A web page developed by the CLS Education team as an accessible learning platform for students and teachers to interact with from anywhere on the planet.	https://sites.google.com/lightsource.ca/virtualclassroom/home
CLS YouTube Channel [Web page]	The official CLS YouTube account with a wide range of playlists, resources, and research information in video form.	https://www.youtube.com/user/CanadianLightSource
CLS Education Programs [PowerPoint]	A PowerPoint that goes over the process of using research in science education and provides an overview of the programs the education team offers.	https://drive.google.com/file/d/1UqyGyXx-zFvV8r6wyMPxTQjQbBdBRFOn/view?usp=sharing

Links/Resources Shared in Chats Throughout the Week

This section will contain any useful links that have been shared during the sessions by fellow participants. We encourage you to share one yourself! This section will be updated as the workshop progresses and sent to you after the workshop closes.

Topic	Summary of Resource	Link/Resource
Synchrotron & Plant-life	Dr. Chithra Karunakaran, one of the researchers and a science manager at the CLS, delivers a presentation on the developments in plant imaging and her studies into drought tolerances and plant waxes.	https://www.youtube.com/watch?v=EN2qtK9LBr4
Synchrotron & Agriculture	A presentation from Dr. Chithra Karunakaran from a previous workshop focusing on connecting synchrotron and agricultural research.	https://drive.google.com/file/d/13YKCNjvPJZoBcRdDHNlsZSTOgHZZRbCa/view?usp=sharing
CLS & Cancer Research	A compilation of research stories from the CLS related to cancer research.	https://www.lightsource.ca/news.html?tag=9
CLS & Cancer Research	A science poster outlining the cancer research performed at the CLS.	https://www.lightsource.ca/ckfinder/userfiles/files/2020cancer.pdf
Global Synchrotrons	The homepage for ALBA synchrotron, located near Barcelona, Spain.	https://www.cells.es/
Science on Stage	A network for STEM teachers to exchange ideas and support one another in professional development and growth.	https://www.science-on-stage.eu/
Science in School	A website which compiles stories and resources related to teaching STEM in classrooms.	https://www.scienceinschool.org/

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