

BIG Science

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BIG Little Scientists has started up again, every Thursday 9-10:30am. We cover a different topic each week for kids age 3-5!



BIG Little Scientists

Parent and tot drop-in sessions for the budding scientist

Discover 

Explore 

Create 

1 mini show, 3 learning zones

THURSDAYS

9:00 - 10:30

January 9 - March 13

First 30 minutes will be in the hands-on room which will be open only to Big Little Scientists. Mini Show will start at 9:00 and learning zones will be open from 9:15 - 10:00. This program is best suited for children aged 3-5. As this is a parent and tot program, we recommend 2 or less children per adult. Standard admission fees, members free.

For more information, visit our website and check our social media for updates and weekly themes.

458 Seymour Street Kamloops
www.blscs.org

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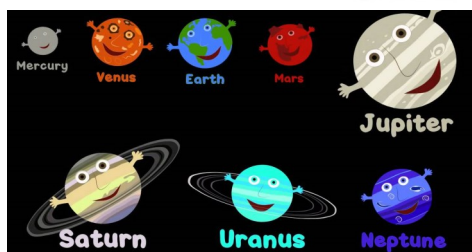
@biglittlescience



JOKE CORNER

How do you throw a party in Space?

You Planet!



Big Little Science Centre
Newsletter

Issue #399 January 2025

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Tuesday Jan 21st
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BIG Science back issues
<<https://blscs.org/newsletters/>>

BIG Little
SCIENCE CENTRE
Explore | Discover | Learn

BLSC LECTURE SERIES

HOSTED BY BIG LITTLE SCIENCE CENTRE

The Basic Chemistry of Any Addiction: How Addiction Works On the Brain

Prevention Specialist, Roxanne L'Esperance, will take a look at the physical, mental, emotional, and spiritual connections to the body.

TUES, JAN 21 7:00PM

At BIG Little Science Centre
Doors open at 6:30pm, lecture at 7:00pm
Entry by donation. Reception included
For older children and adults

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www.blscs.org
Joann@blscs.org



Become a member of the Big Little Science Centre Society

A family membership is \$85.00/year. An individual membership is \$55.00/year. A family membership consists of a maximum of 6 directly related people. (This includes any combination of grandparents, parents and children).

Visit our website blscs.org for more details on the benefits of membership.

OFFSITE SCHOOL GROUP BOOKINGS!

School groups are one of our most regular visitors on week day mornings. But did you know that we can come to the school? It saves on travel costs and means you don't have to drag 20-30 students across busy downtown Kamloops!!

Off Site School Shows:

\$300 for one 45-minute show

\$500 for two 45-minute shows

More than two shows, please call for an estimate

Off Site Class Labs:

Labs without a booked school show: \$10 per participant, minimum charge \$150.00 per lab

Labs with booked school show(s): \$5.00 per participant, minimum charge \$125.00 per lab

Lab Choices, all 45 minutes:

Circuits, Chemical Reaction Labs, Colour Lab, Sand & Crystals, Fluids, pH tests, Bee & Pollinator Lab, Structures and Water Lab.

Labs will be set-up in one location at the site/school with groups coming to that location.

Call 250-554-2572 or email joann@blscs.org for more information



DID YOU ALSO KNOW ...

You can also find us out and about in the community? Come and check us out on Saturday January 25th at the ABC Family Literacy event from 9-12pm at the John Tod Centre, and on Family Day Monday February 17th at the Tournament Capital Centre! We will have lots of your favourite puzzles, and make and take activities to take home with you! We look forward to seeing you there!

The BIG Little Science Centre is open to the public

Public Drop-in Hours: Tuesday to Saturday 9:30 AM - 5:00 PM.

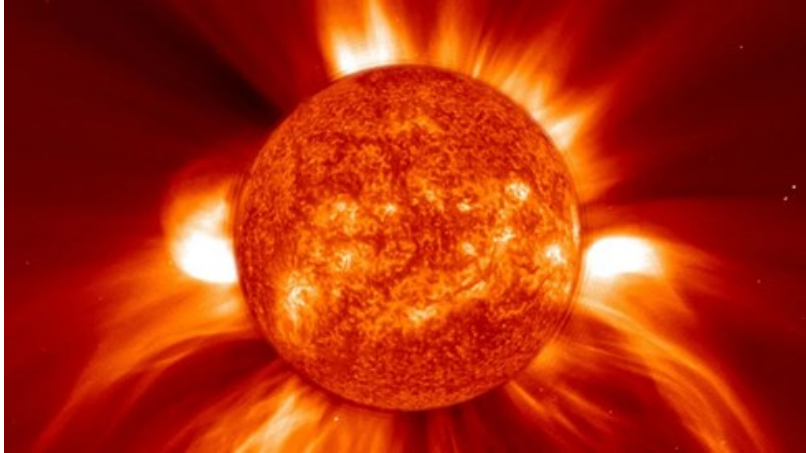
CLOSED SUNDAYS and HOLIDAYS

Phone: 250 554 2572 E-mail Gord@blscs.org or Joann@blscs.org

For more information check out our website (blscs.org), or our Facebook page.

Our Active Sun

Jim Hebden, PhD



Our sun, like all stars, started off as a region in space where a vast and slowly-rotating cloud of very cold gas and dust contained numerous irregular clumps of matter. As gravity pulled each clump of gas and dust closer together, a critical mass was eventually reached in our pre-sun's particular clump and the clump started to collapse into the shape of a gigantic flattened disc with a ball-like blob in the centre. This disc and central blob became increasing smaller and denser and eventually become our solar system and sun. Localized irregularities in the flattened disc were eventually pulled together by gravity to become planets. As gravity continued pulling the giant mass material together, the material closest to the center began rotating the fastest. The particles in the central ball struck each other increasingly faster and harder, which in turn caused the ball to get increasingly hotter. Eventually, the centre of this "proto-star" became so hot that some hydrogen atoms had enough energy to **fuse** together when they collided. Our sun was soon about to start shining.

The collision-and-fusion process occurs in three steps. First, two hydrogen atoms (actually just a bare hydrogen nucleus, called a **proton**) fuse together to form a heavier isotope of hydrogen called **deuterium**, as well as a positively-charged anti-electron called a **positron**, and a particle with no mass or charge called a **neutrino**.

The next step occurs when the deuterium produced in the first step is struck by, and fuses together with, another proton. The result is an isotope of helium called **helium-3** (He-3) plus a blast of energy called a **gamma** particle.

The final step occurs when two He-3 nuclei strike and fuse together to form a stable helium-4 (He-4) atom, plus two protons, and still more energy. The overall reaction is therefore the fusion of four protons to form a helium atom, two positrons, two neutrinos, and two highly energetic gamma rays. The total mass of the products is slightly less than the total mass of the reacting protons. The energy produced in the overall reaction is calculated from the Einstein equation, $E = m \cdot c^2$, which can be interpreted as "if a reaction loses mass, it also loses (gives off) energy". In other words, when four hydrogen nuclei fuse together to form a helium atom there is much more energy produced than was used to cause the reaction. NASA has calculated that the sun is burning about 4.4 million tonnes of hydrogen every second and has consumed about 0.03% of its available hydrogen. Besides converting hydrogen atoms into helium atoms, the sun also converts some of its more energetic protons into lithium, beryllium, boron, carbon, nitrogen or oxygen. At present, the sun still contains 91% hydrogen atoms, 9% helium atoms and 0.1% other atoms.

It is estimated that our sun first began to "shine" as a result of the three-step fusion process about 4.6 billion years ago and will continue for about 5 billion more years. By comparison, the galaxy in which our sun resides is estimated to have formed from an incredibly-large cloud of gas and dust about 13.6 billion years ago.

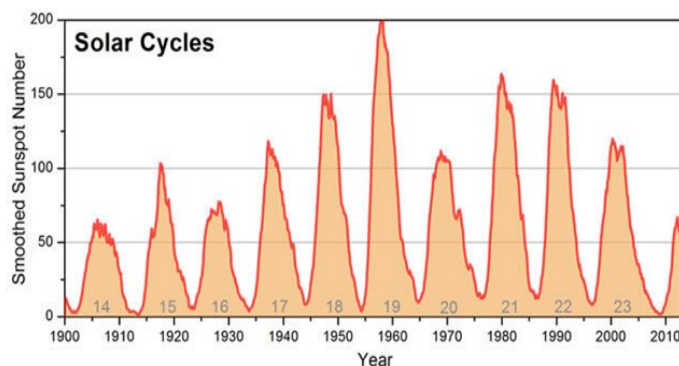
Interestingly, the sun also contains some heavy elements such as sodium, magnesium, calcium, nickel and iron, which the sun **does not** produce on its own. So, if the sun can't produce heavy elements such as iron, where did the heavy elements come from?

The answer is that during the billions of years after our galaxy was formed, but long before our sun was formed, many massive stars were formed that burned very hot and fast. Within a few million years these stars used up their nuclear fuel, and then in a few seconds completely collapsed, heating up tremendously and exploding in a **supernova**. Each supernova exploded outwards into space while producing vast amounts of heavy elements such as iron, gold and uranium. Some of these heavy elements eventually collected together as part of the dust and gas that eventually became our sun and planets. That is why the cosmologist Carl Sagan once said “The nitrogen in our DNA, the calcium in our teeth, the iron in our blood, the carbon in our apple pies were made in the interiors of collapsing stars. We are made of star stuff.”

You might be tempted to think that the sun always stays the same, “just cruising along doing its thing”. And this is where you would be very wrong and things get very interesting. In a period of 1 to 2 years, our sun’s magnetic field completely flips so that its north pole and south pole change places. This reversal occurs about every 11 years in what is called the **solar cycle**. (This is different from a 27-day cycle during which the sun rotates once on its axis.)

The solar cycle is traced by observing the number of **sunspots** seen during the cycle. A sunspot is a dark area on the surface of the sun where magnetic fields from deep in the sun erupt out from the sun’s surface. Sunspots have a temperature of about 3600°C and appear dark compared to the brighter 5500°C surface of the sun. At the start of the solar cycle, there are no or very few sunspots. As time passes, more sunspots are seen until there is a maximum number about halfway through the 11 years. After that, the number of sunspots slowly decreases until the cycle ends.

At present, we are getting close to a solar maximum in which many magnetic storms erupt out of the sun through sunspots. These solar flares cause increased number of high energy atomic particles to spew into space and strike the Earth’s outer atmosphere. The result is **geomagnetic storm** activity in our upper atmosphere which in turn causes increased Northern and Southern Light activity. Because the timing of the sun’s magnetic pole flip occurs around the solar maximum, we know that the sun’s poles are getting ready to flip north to south and vice versa.



Extreme cases of solar activity are called **coronal mass ejections** (CME) which result in billions of tonnes of charged particles in the sun’s outer **corona** to be blasted away from the sun. A CME is so large that it has its own strong magnetic field that overwhelms the normal **solar wind’s** magnetic field. (The **corona** is the outer atmosphere of the sun, above its surface, and which has a temperature between 1 and 2 million degrees Celsius. Although extremely hot, the corona is much less bright than the surface and can only be seen easily during a solar eclipse. **Solar wind** is the normal flow of particles and their accompanying magnetic field which are ejected from the sun and carry outwards to space and the planets.) During a solar maximum (highest number of sunspots) there are about three CME’s every day, whereas during a solar minimum (fewest sunspots at end of 11-year cycle) there is about one CME every 3-5 days.

The recent intense Northern Light activity has been caused by CME’s having the potential to cause disruption to some electronic devices. High-frequency radio communications are particularly at risk as well as **Global Positioning Systems** (GPS). During a CME solar flare, astronauts have to take special precautions to deal with the increased radiation caused by the high energy particles striking our atmosphere. The most extreme form of a CME is called a **Carrington** storm, named after British astronomer Richard Carrington. In this extreme case, the electrical energy striking the Earth’s atmosphere would be so great that global air traffic would be restricted because of increased radiation doses at higher altitudes, satellites would be disrupted, mobile networks would collapse, widespread power outages would occur and intense Northern Lights would be seen almost down to South America. However, such an extreme CME is considered a once-in-a-hundred-years event ... Carrington experienced the event named after him in 1859.



TEASERS!!



THANK YOU—JUNIOR ROBOTICS PROGRAM

The Big Little Science Centre Society would like to extend our gratitude to the City of Kamloops Social and Community Development Grant program for their generous support in the startup of the BLSC Junior Robotics Club. We are immensely grateful for the \$6,000 grant, which has been instrumental in assisting with purchasing the necessary equipment to run our camps and clubs.

This grant, combined with the \$3000 funds raised from the Murder Mystery Adult BIG Night Out in the fall, has provided us with the resources needed to launch this exciting program. We are thrilled to announce that more details and start dates will be shared sometime in February.

Thank you once again to the Social and Community Development Grant program for the invaluable support in helping us inspire the next generation of young learners.

SPRING BREAK CAMPS

Its almost Spring Break, well, 9 weeks away to be exact, but it is time to start thinking about what to do with the kids!! Spring Break Camps at BIG Little Science Centre are fun, engaging and filled with hidden Science Education. They typically fill up fast so don't delay if you would like to register your grade 1-4 child(ren)! Both weeks—March 17-21 and March 24-28—will be the same this year. Registration opens Tuesday January 21st 2025. Cost is \$250 for one week, members get a \$25 discount . For more information and the registration form please go to our website

[March Break](#)

NEXT ADULT EVENT—SCIENCE OF WINE AND FOOD PAIRINGS

Thursday March 6th 2025. Doors Open at 6:30pm, wine tasting starts at 7pm. Tickets are \$30 plus fees and taxes

Why do certain wines pair better with certain foods? What flavors make your Riesling sing and Cabernet Franc fall flat? Returning for a second year, Monte Creek is taking their wine and knowledge to the BIG Little Science Centre for an adult-only BIG night out! Join us, as we dive into the science of wine and this year take it one step further with a few trade secrets on how to enjoy your favorite glass best.

Immerse yourself as we explore the science behind the bottle, taking you through details on why and how wine goes so well with different foods. Dive into the different flavors beyond the grapes and learn how different food flavors impact the taste of each sip. This exclusive after-hours gathering offers an exciting blend of science and fun to enhance your appreciation for the intricate details beyond the glass.

Your ticket grants you access to interactive exploration in the hands-on room, complemented by a curated wine and food tasting. All profits from this event go towards supporting the Big Little Science Centre and its initiatives. Don't miss this unique opportunity to deepen your understanding of wine in a fun and engaging setting.

Limited tickets are now on sale from the Monte Creek website.

[The Science of Food and Wine - Monte Creek Winery](#)