

## **ANCESTRAL SCIENCE PODCAST**

SEASON 2: Episode 11 ([audio](#)/video)

with **Corey GRAY**

“Gravitational Waves with the Blackfoot MacGyver”

The Ancestral Science Podcast was grateful to chat with Blackfoot Physicist Corey Gray about inspiring to be the "Blackfoot MacGyver," the connection between the Blackfoot language and Albert Einstein, how we are all a part of space-time, chirps and gravitational waves, supermassive blackholes and wolf eyes, and the importance of seeing people that "look like you" in science and physics.

Hand to heart to support from [Indigenous Screen Office](#) and [Storyhive](#).  
Take a moment to like, share, follow, and rate, it is much appreciated.

Now, open your minds and heart to teachings from the very very big to the very very small.

Remember, you can support the pod and rock some unique Indigenous Science merch at [www.relationalsciencecircle.com/shop](http://www.relationalsciencecircle.com/shop), all proceeds go towards Knowledge Keeper honoraria, following protocols, and keeping the pod going.

### **SHOWNOTES:**

#### **Gravitational Wave global collaborations:**

LIGO: [Laser Interferometer Gravitational-Wave Observatory](#)

[VIRGO](#): Gravitational Wave detector in Italy

[KAGRA](#): Gravitational wave detector in Japan

#### **What is Science to you?**

- humanity's ability to analyze their surroundings
- it's how humans survive on the land, like how the Blackfoot people followed the buffalo, knew when to harvest plants, and survived through the long cold winters

#### **Blackfoot MacGyver:**

- from Corey's love of science fiction to being inspired by his dad who was an engineer, along with his love of the tv show.
- <https://www.cbc.ca/news/canada/calgary/corey-gray-siksika-blackfoot-nation-mcgyver-1.5145208>

#### **Gravitational Waves:**

- Based on the [General Theory of Relativity](#) from Albert Einstein in 1915. General Relativity (GR) helped to better explain gravity at extreme cosmic scales (think of super compact objects such as neutron stars and strong gravity places in the universe such as black holes! General Relativity also introduces us to spacetime and gravitational waves.

- All mass affects the fabric of space-time, by bending and warping space and time.
  - Bigger & compact masses, like neutron stars and black holes, bend and warp spacetime more
  - Gravitational waves occur in space-time when a mass accelerates
- Rainer “Rai” Weiss conceived of the idea of making a gravitational wave detector with a large scale interferometer back in the early 1970s. This type of instrument would be like a giant ruler, because it very precisely measures length---we’re talking a length resolution of 1000 times smaller than the diameter of a proton! These are the most sensitive instruments ever created (and this precision is needed because gravitational waves are extremely small when they pass through the earth.
- Almost exactly 100 years after Einstein unveiled General Relativity, the first gravitational wave was detected in September 2015. The signal which was recorded by the pair of LIGO detectors shows a waveform which increases in frequency and amplitude in less than a second. This historic signal is in the human audible range and it is described as a “chirp”
  - listen to the historic chirp here:  
<https://www.ligo.caltech.edu/video/ligo20160211v2>

### Impact on Indigenous Communities:

- Importance of languages, especially Indigenous languages
- The first direct detection of gravitational waves from a source of colliding black holes has been hailed as one of the biggest discoveries of the last century. When LIGO was getting ready to formally announce the discovery, they wanted to share this news with the world in as many languages as possible. Corey suggested “what about Blackfoot?”
- Corey was able to recruit his mother, Sharon Yellowfly, to translate the announcement into Blackfoot for the LIGO Scientific Collaboration (LSC). Yellowfly also had help from her family.
  - “[my mom is a poet for Albert Einstein and astrophysics!](#)” (Corey Gray AISES)
- Connection between Albert Einstein and the Blackfoot language
- “[Gravitational Waves and the Poetry of Blackfoot](#)” in Scientific American
- bisaatsinsiimaan*: “beautiful plantings” / general theory of relativity
- sigooxgiya*: black hole
- Abuduuxbiisiiya o?bigimskAAsts*: “they stick together waves” / gravitational waves
- “[Black holes in Blackfoot and colorful chemistry in Navajo](#)” c&en
- “[Blackfoot Songs of Gravity](#)” an online presentation by Corey Gray for University of California at Santa Cruz’s American Indian Resource Center (AIRC)
- [Einstein’s Garden](#)” Symmetry Magazine
- Aha moment of bringing the stories of gravitational waves back to Siksika Nation at the annual pow wow through the “gravitational wave grass dance special”
  - NPR article [here](#)
  - Gravitational wave grass dance special at the 2017 Siksika Nation Fair & Pow Wow [video](#)

-From this dance, a synchronization of energy, frequencies, and intentions within prayers, to a face painting ceremony, lead to significant happenings with his work that included the 1<sup>st</sup> “triple detection” (both LIGO + Virgo detectors) and the 1<sup>st</sup> gravitational wave detection from a binary neutron star merger.

### **Quantum Squeezing:**

-An upgrade to improve the sensitivity of gravitational wave detection

-[LIGO Quantum squeezing animation](#)

-This exploits Heisenberg’s uncertainty principle, which states the more you know about light intensity the less you can know about its frequency. Quantum squeezing reduced the lasers frequency uncertainty while increasing its intensity uncertainty.

-“How Quantum squeezing will help LIGO detect more gravitational waves”

[ScienceNews](#)

### **Representation in Science:**

- It’s huge to be able to see people who look like you doing cool things, whether it’s science, engineering, medicine, sport, art, etc. Being able to amplify representation of other Indigenous scientists across all fields is vital for the young ones and next generations.

### **Gravitational Wave importance to the everyday human:**

-We now have a completely new and different sense to look at the universe

-A Completely new field of science was born: Gravitational Wave Astronomy

-Kids now live in a world where space and time has been proven to be wiggled by colliding black holes and neutron stars. This can plant a seed of wonder in young ones to pursue science and be the next Einstein!

-Blackholes gobbling neutron stars!

-This field is also developing the next generation of scientists pushing the boundaries of science

### **Makoiyosokoyi: Milky Way/Wolf Trail:**

-Story told in the episode gifted to the SPARK Science Centre for the Film “Blackfoot Skies” (film by Tito Gomez & Pamela Beebe) and the program “Paws, Claws, and Stars” by Floyd & Maxine Big Head, Diana Melting Tallow, Casey Eagle Speaker, & Rob Cardinal.

**Additional Links:**

<https://www.cbc.ca/news/canada/calgary/corey-gray-siksika-blackfoot-nation-mcgyver-1.5145208>

<https://www.npr.org/2024/11/08/1211597243/neutron-star-gravitational-waves-detected-ligo>

Gravitational wave SOUND: <https://www.ligo.caltech.edu/video/ligo20160211v2>

“Trip The Gravitational Wave Fantastic” an article written by Corey Gray. (In 2020, Corey’s colleague, Nobel Laureate, Kip Thorne read this article and told Corey, “It moved me to tears. You write so very beautifully, and to see this from your perspective was inspiring to me.”) <https://medium.com/stem-and-culture-chronicle/trip-the-gravitational-wave-fantastic-12e461cc389b>

---

Gratitude to the support from JUAN-CARLOS CHAVEZ, the editing and audio skills of EMIL STARLIGHT of Limelight Multimedia, and ALEX FLETT for marketing and pod support.