

Cosmic Explorer Symposium

Apr 23-25 2024

Matthew Evans on behalf of CE Project



COSMIC EXPLORER



Artists: Edward Anaya, Virginia Kitchen,
and Angela Nguyen (Cal State Fullerton)



Why are we here?

- Over 300 people registered for this Symposium, thank you!
 - And many thanks to the SOC and LOC!
- Main objective is to advance the CE design
 - strategize how to move forward on several important design aspects that have an impact on the CE facility
 - share your thoughts, concerns, advice
 - please raise your hand or type in the chat, the chairs will moderate the discussions
- A document with a summary of the main points and action items that emerge from the symposium will be produced (and circulated) to inform next steps



Brief recap

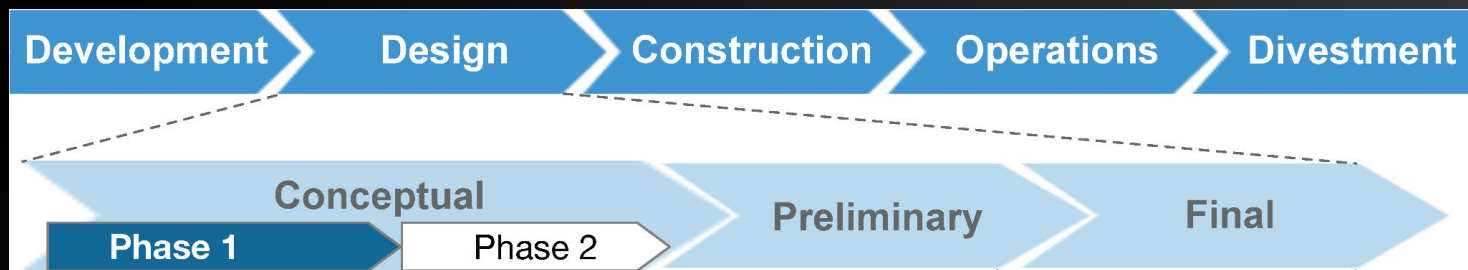
Cosmic Explorer is the US concept for a next-gen gravitational-wave observatory

- 40 km and 20 km L-shaped surface observatories
- roughly 10x sensitivity of today's observatories
- Will operate as part of a global network with Einstein Telescope, LISA, and others

CE is envisioned as an NSF-led Project

- Several coordinated grants by the NSF to work on aspects of CE conceptual design, including: vacuum technology research, site evaluation and IPP-RS, detector optical design, mode sensing and control, project core

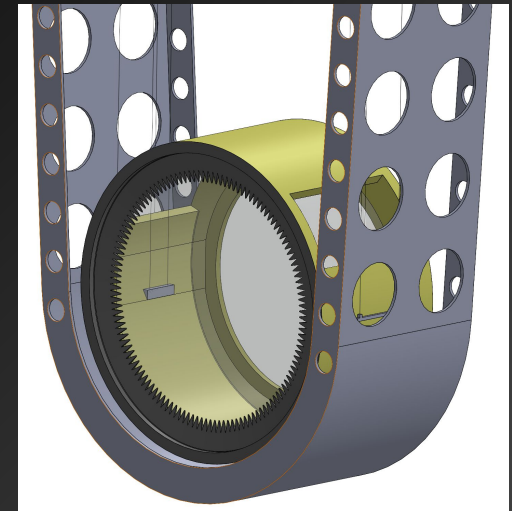
NSF processes define the possible CE funding path and project timeline (see the NSF Research Infrastructure Guide, and [Pedro's talk later in this session](#))





More activities ramping up

- Major vacuum proposal led by Mike Zucker recently submitted to the NSF – goal is to build a “sector test” prototype of the CE vacuum tube
 - work is tightly coordinated with CERN and the ET vacuum team
- Straylight mitigation, Newtonian noise mitigation, scientific computing, **suspension design**
 - stay tuned
- Activities ramping up in the UK





MPSAC subcommittee

<https://www.nsf.gov/mps/phy/nggw.jsp>

- NSF MPSAC (Mathematical and Physical Sciences Advisory Committee) sub-committee charged to advise NSF on the path forward for next-gen GW observatory in United States
- CE white paper submitted to the MPSAC last year ([CE-P2300018, public](#)), led by Alessandra Corsi
- Committee report recently delivered:
 - Cosmic Explorer recommended to the NSF!
- Committee chair Vicky Kalogera and NSF gravity program director Pedro Marronetti both kindly agreed to discuss with us what this report says and what it means for CE (**starting at noon EDT today**)



The CE Consortium

[join the CE Consortium](#)

- Crucial role of the Consortium in strengthening the CE science case
 - [Science Letters](#) prepared in support of the CE white paper to the MPSAC
 - Overview and discussion of **Science Letters**
Tomorrow at 3PM ET
- What is the best way to continue engaging this community? What would you like to see?
- Discussion on how to evolve the Consortium and improve its structure in the
Thursday Plenary at 3.45pm ET

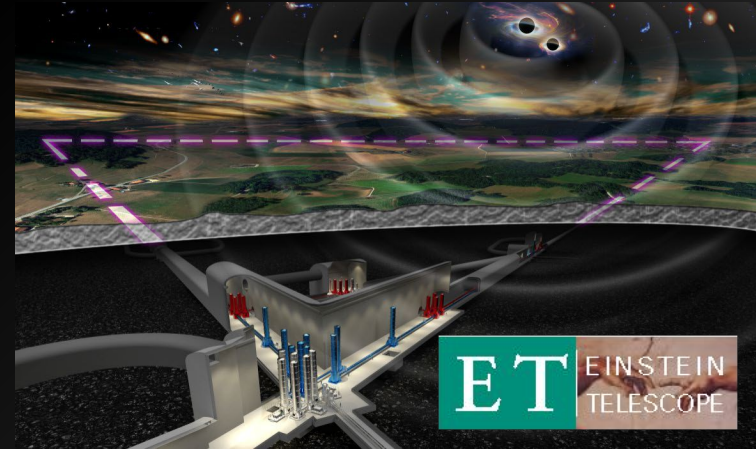
Coordination with Einstein Telescope



NeXt-Generation Collaborative Design (XGCD) meetings:

- A forum for regular discussions between the teams that work on common design aspects of ET and CE design, approximately once every two months
- Open to the ET collaboration and CE consortium members
- Contact Lisa Barsotti and Jan Harms with suggestions for future topics and format

We are in contact with the ET leadership to find ways to expand and strengthen our collaboration





Building Connections with DOE

- CE participated in the Snowmass process (thanks to Stefan Ballmer, Sathya, and others), advocating for the inclusion of next-gen gravitational-wave observatories in DOE scope
- Recommendation in the [P5 report](#) positive, but limited:

Gravitational waves are a powerful new tool for exploring a range of astronomical and particle physics topics, including probing the expansion history of the universe using standard sirens. NSF has been an excellent steward of this program and should support the development of new capabilities and a next-generation project. The particle physics case for studying gravitational waves at all frequencies should be explored by expanded theory support.

Discussion on how to act on the P5
recommandation in the

Thursday Plenary at 3 pm ET



Today Plenary, 11am - 1pm EDT

11:00	Status of Cosmic Explorer	<i>Matthew Evans</i>
	<i>Zoom</i>	11:00 - 11:20
	Highlight: Status of site evaluation and IPP-RS	<i>Joshua Smith et al.</i>
	<i>Zoom</i>	11:20 - 11:40
	Discussion	
	<i>Zoom</i>	11:40 - 11:45
12:00	Survey announcement	<i>Joey Key</i>
	<i>Zoom</i>	11:45 - 11:55
	Discussion	
	<i>Zoom</i>	11:55 - 12:00
	MPSAC Report	<i>Vicky Kalogera</i>
	<i>Zoom</i>	12:00 - 12:20
12:00	Discussion	<i>Alessandra Corsi</i>
	<i>Zoom</i>	12:20 - 12:30
	The perspective from NSF	<i>Pedro Marronetti</i>
	<i>Zoom</i>	12:30 - 12:50
12:00	Discussion	<i>Lisa Barsotti</i>
	<i>Zoom</i>	12:50 - 13:00
13:00	One minute one slide - #1	<i>Prof. Salvatore Vitale</i>
	<i>Zoom</i>	13:00 - 13:10

Today Instrument Science 3-5pm EDT



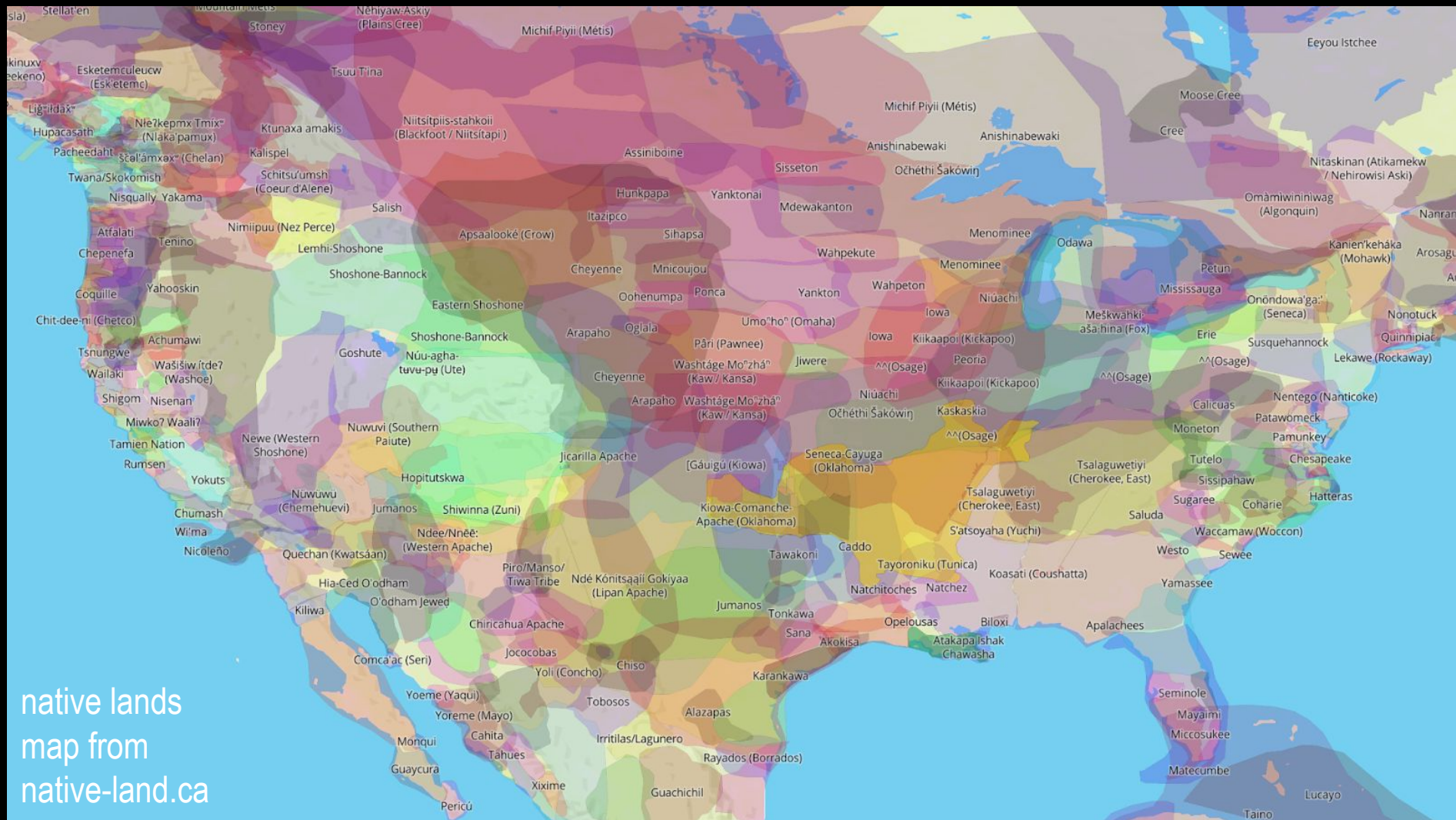
15:00	CE optical layout <i>Zoom</i>	<i>Paul Fulda et al.</i> 15:00 - 15:20
	Discussion <i>Zoom</i>	<i>Dan Brown et al.</i> 15:20 - 15:50
16:00	Impact of coatings on CE design <i>Zoom</i>	<i>Kevin Kuns</i> 15:50 - 16:05
	Coatings: state of the art <i>Zoom</i>	<i>Gregg Harry</i> 16:05 - 16:25
	Discussion <i>Zoom</i>	<i>Steve Penn et al.</i> 16:25 - 17:00

17:00



FAQ #1: So... where exactly do you plan to build CE?

Site evaluation and Indigenous and Place-based Partnerships and Responsible Siting (IPP-RS)



native lands
map from
native-land.ca

Work led by Josh Smith (CSUF) and Kate Daniel (UA)

Cosmic Explorer Land Acknowledgement

**We live and work on the
ancestral lands of Indigenous peoples.**

**The Cosmic Explorer team recognizes the inherent
connections between the lands, waters, sky, and people.**

**We are committed to cultivating connections to place and
partnerships with Indigenous communities who care for,
have cared for, and will continue to care for these places.**

**We acknowledge that we are responsible for the
manner in which we do science and for the
impacts it has on the land and its Peoples.**

native lands
map from
native-land.ca

learn more about land
acknowledgements at
nativegov.org