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Carsten B Krauss

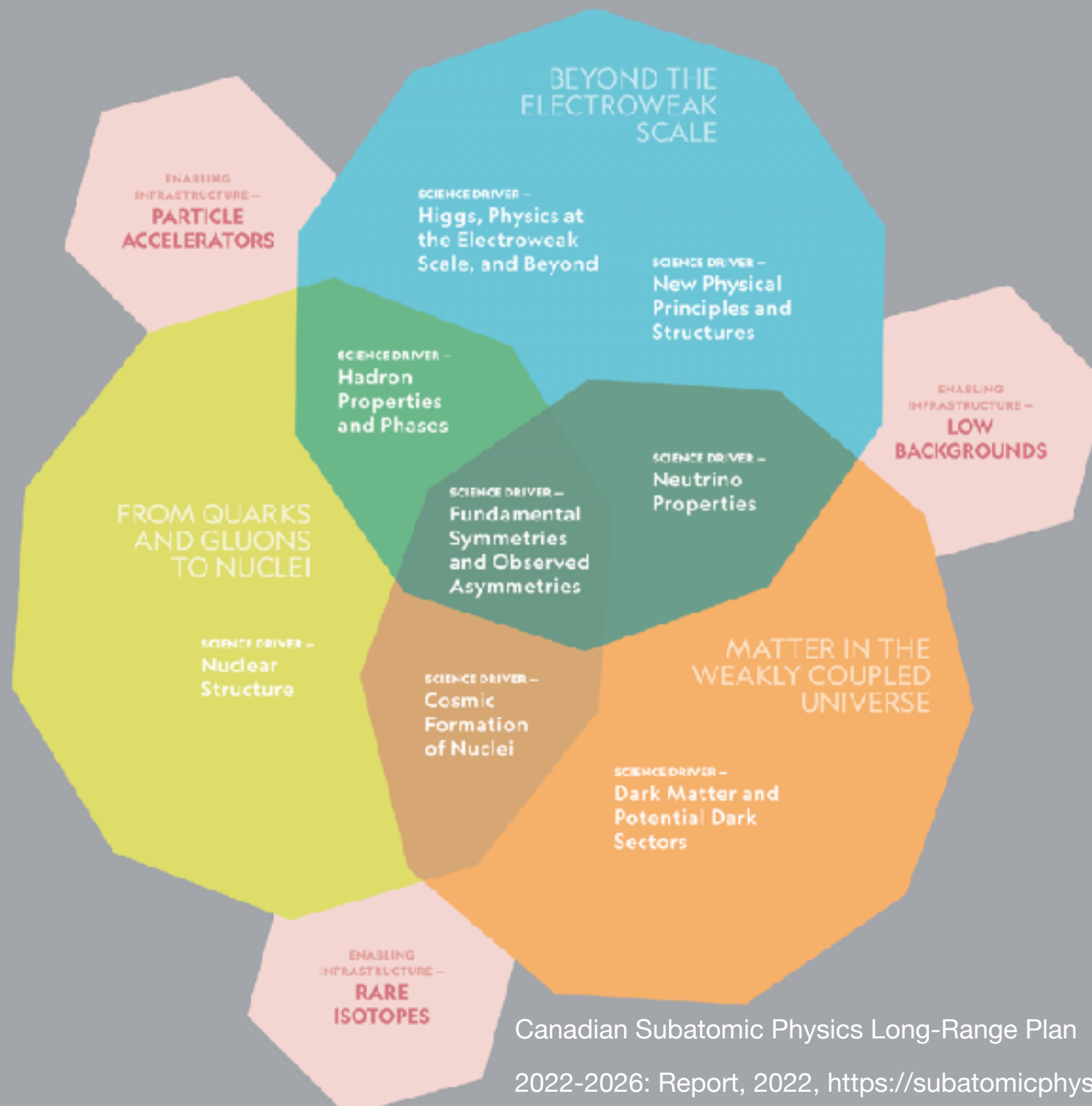
Director, Institute of Particle Physics

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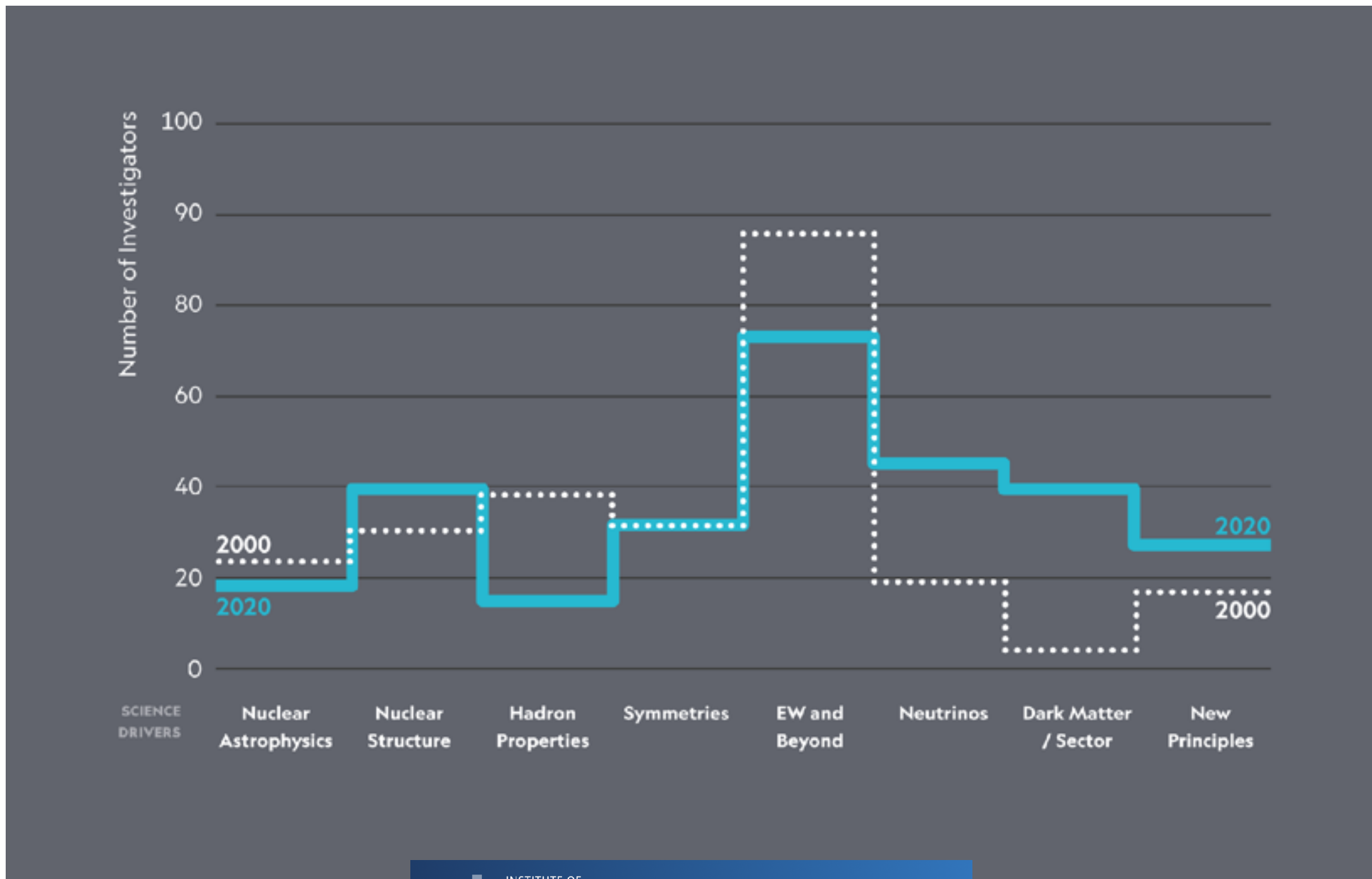
Long Range Plan



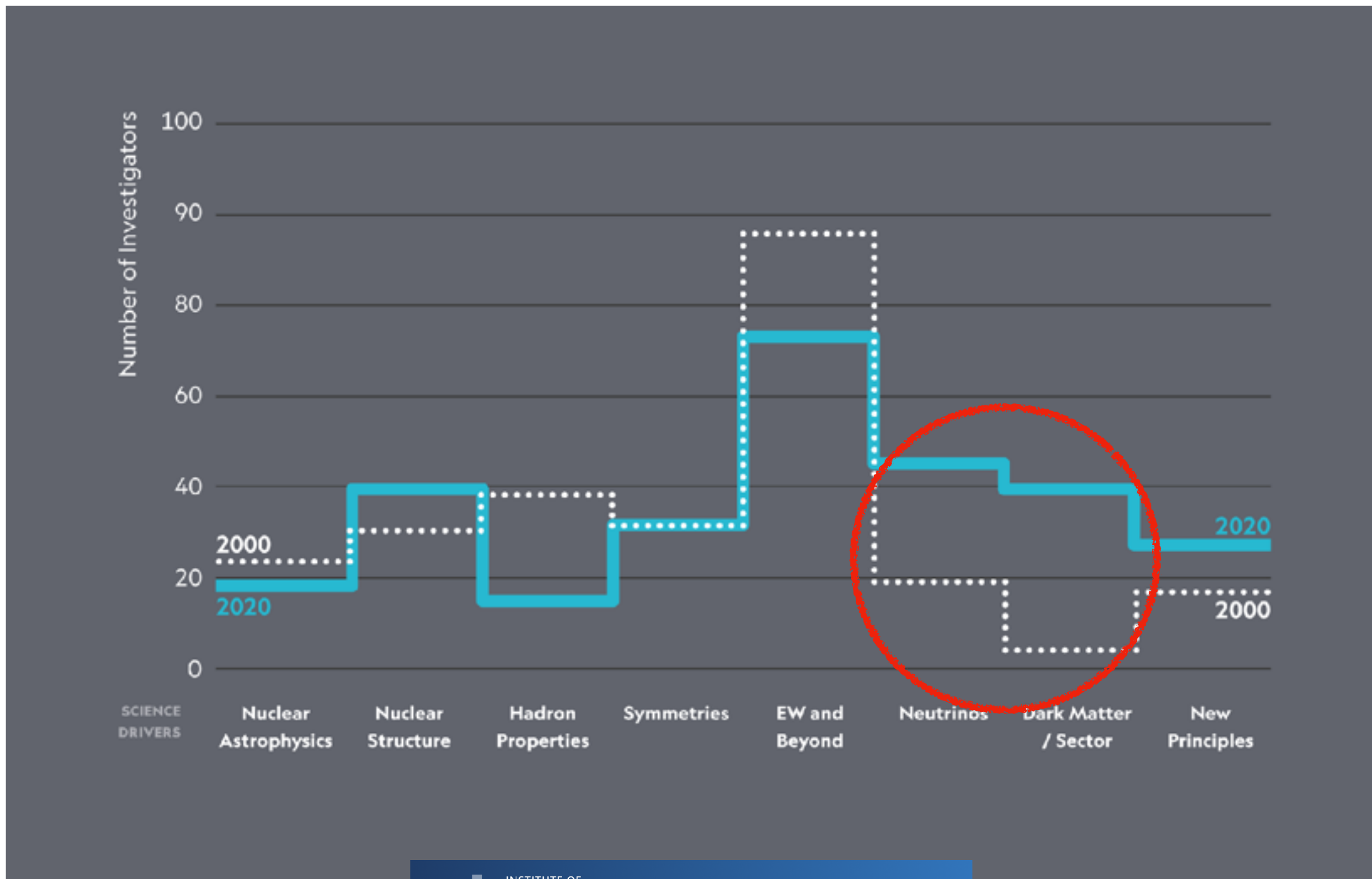
Canadian Subatomic Physics Long-Range Plan

2022-2026: Report, 2022, <https://subatomicphysics.ca>

Profile of Topics in Canadas Subatomic Landscape



Profile of Topics in Canadas Subatomic Landscape



Canadian Labs and University Involvement

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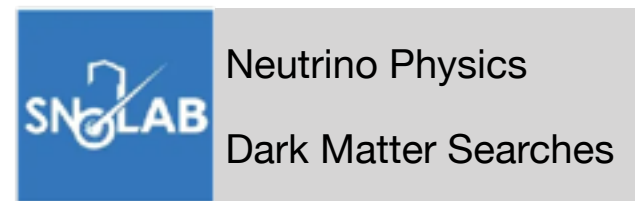
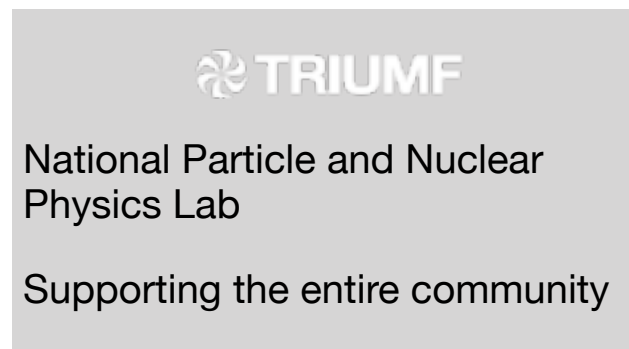


National Particle and Nuclear
Physics Lab

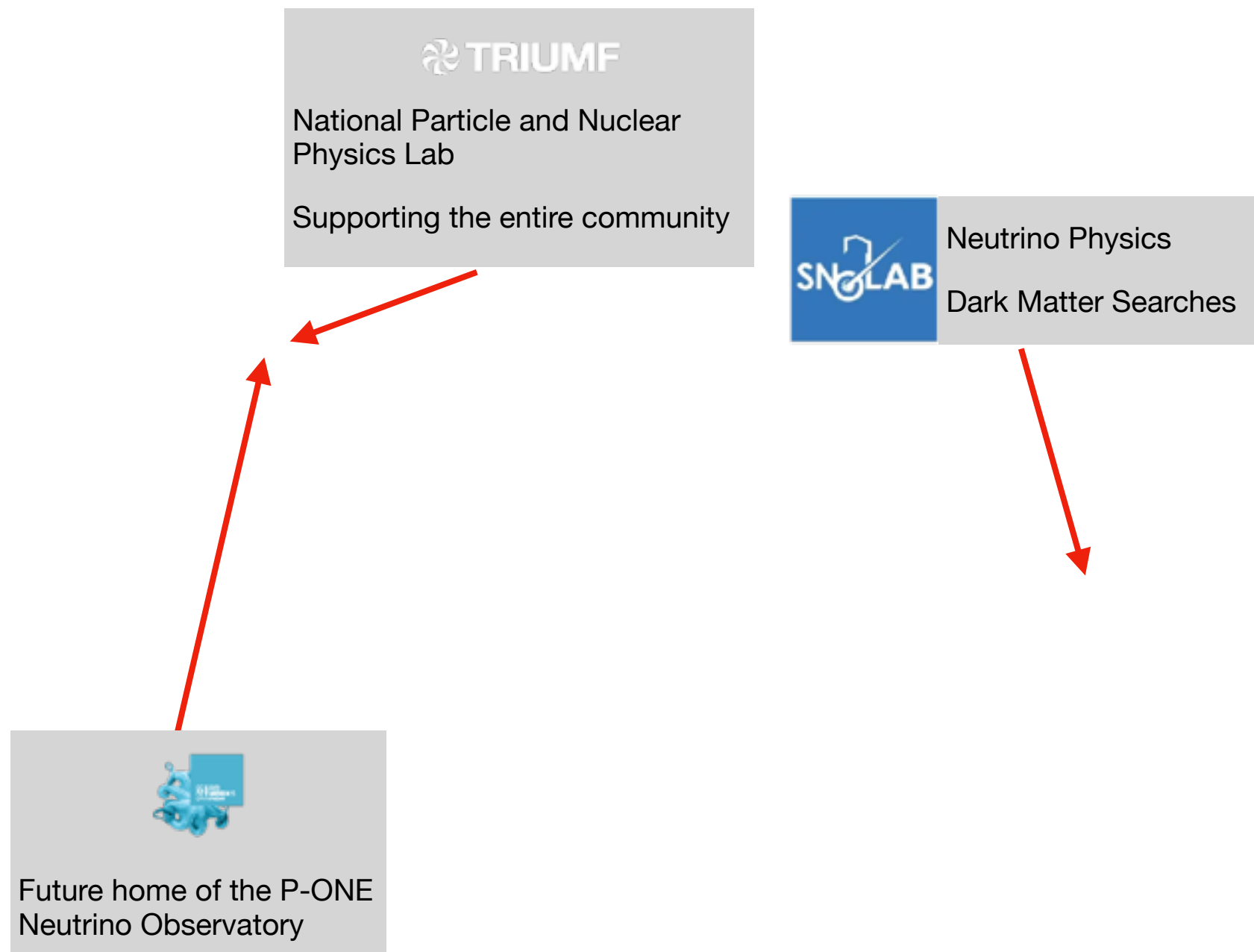
Supporting the entire community



Canadian Labs and University Involvement



Canadian Labs and University Involvement



The charge for a new LRP

- The Canadian funding agencies specifically asked the committee to provide guidance which large project(s) are community priorities and should be treated as such.
- This is a Canadian peculiarity as the agencies do not have a strategic mandate, they fund purely driven by proposals at hand. The LRP allows the agencies to inject some element of long term strategy.

Canada Long Range Plan

- For the new long range plan, the community is planning to embark on these large future projects (>\$150M CAD)
 - FCC-ee at CERN
 - XLZD (at SNOLAB)
 - P-ONE at part of the NEPTUNE ocean network
- Canada has been part of or home to similar sized project in the past (LHC, ATLAS, SNO). However the structural support for such projects is in need to improvement



Highest Priority

Recognized by the Committee as highly impactful in addressing the important questions and also garner broad support of the community.

A focused effort in these projects positions Canada as a long-term global leader in the field.

Resources to be allocated permitting them to reach the optimal impact of the Canadian Community.



Highly Recommended

Highly impactful in addressing the important questions and also garner broad support of the community.

Identified for growth that will achieve the main goals of a focused program.



Strongly Recommended

Have unique scientific objectives that are complementary and for which current resource levels should be considered for slight growth where appropriate depending on the project's life-cycle.

Important



Continuing

Current resource levels should be maintained. In a constrained budget scenario, major upgrades to the capacity of these projects are ranked with a lower priority.



Concluding

Projects for which no further CFI requests are foreseen, or where further CFI requests would not be recommended. For those projects NSERC support remains important as these projects conclude over the next few years.



Target-Specific

High-value endeavours with targeted scope and limited financial resource needs.

Continue support for these projects at modest levels.



Limited Support

There are additional proposed large-scale experiments with interest from the Canadian community.

There is currently insufficient motivation to devote significant resources to them at this time.

Highest Priority Future Project



Broad and very strong community support

Considered by the Committee as future projects with the greatest potential scientific return on investment

Substantial involvement in those projects will confirm Canada's position as a global leader in scientific research

Resources to be allocated to reach the optimal impact of the Canadian Community

Projects

- EIC
 - Uniquely address profound questions about nucleons and probe how the nucleon-nucleon interaction arises from the QCD regime within the hadrons
 - Allow precision studies of the 3D structure of hadrons, gluon saturation, and the dynamics of quark-gluon interactions across a wide kinematic range
- FCC
 - Largest breadth of program
 - In line with European strategy and CERN council
- XLZD@SNOLAB
 - Potentially transformative opportunity to host at SNOLAB
 - Would establish Canada as the global centre for next-generation direct dark matter detection and the search for neutrinoless double beta decay

What will this mean?

- There is a strong momentum building in Canada to support XLZD
- Both the dark matter and low energy neutrino communities are likely going to re-orient themselves toward supporting XLZD in Canada, if funding traction can be build and maintained
- Both SNOLAB and McDonald Institute leadership have voiced strong support for hosting XLZD at SNOLAB
- A true mechanism for funding and delivery of a project of this scale will still need to be identified.

The SNOLAB Advantage

- There is a great amount of expertise at SNOLAB regarding dark matter searches:
 - DEAP-3600, Super CDMS, NEWS-G, DAMIC, SENSEI, PICO-40L, PICO-500 are/were all located at SNOLAB
- The lab is very deep and offers excellent services, improving power delivery (uptime) year over year. The team is also helping to make the limitations of the shaft a minor issue

Outlook

- With the “nEXO” side of liquid noble detector experts joining XLZD, Canada has a key expertise to offer for XLZD. The new Long Range Plan is expected to strongly embrace the opportunity to host the experiment
- SNOLAB has a unique strength in supporting dark matter experiments, with a strong, well trained workforce, a group of experienced vendors surrounding the lab and space that will become available on the timeline for XLZD
- Canada has once before seized a unique opportunity to deliver outstanding leadership in neutrino physics. It's on us to figure out how to repeat this



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**Thanks for inviting me,
thanks for listening**