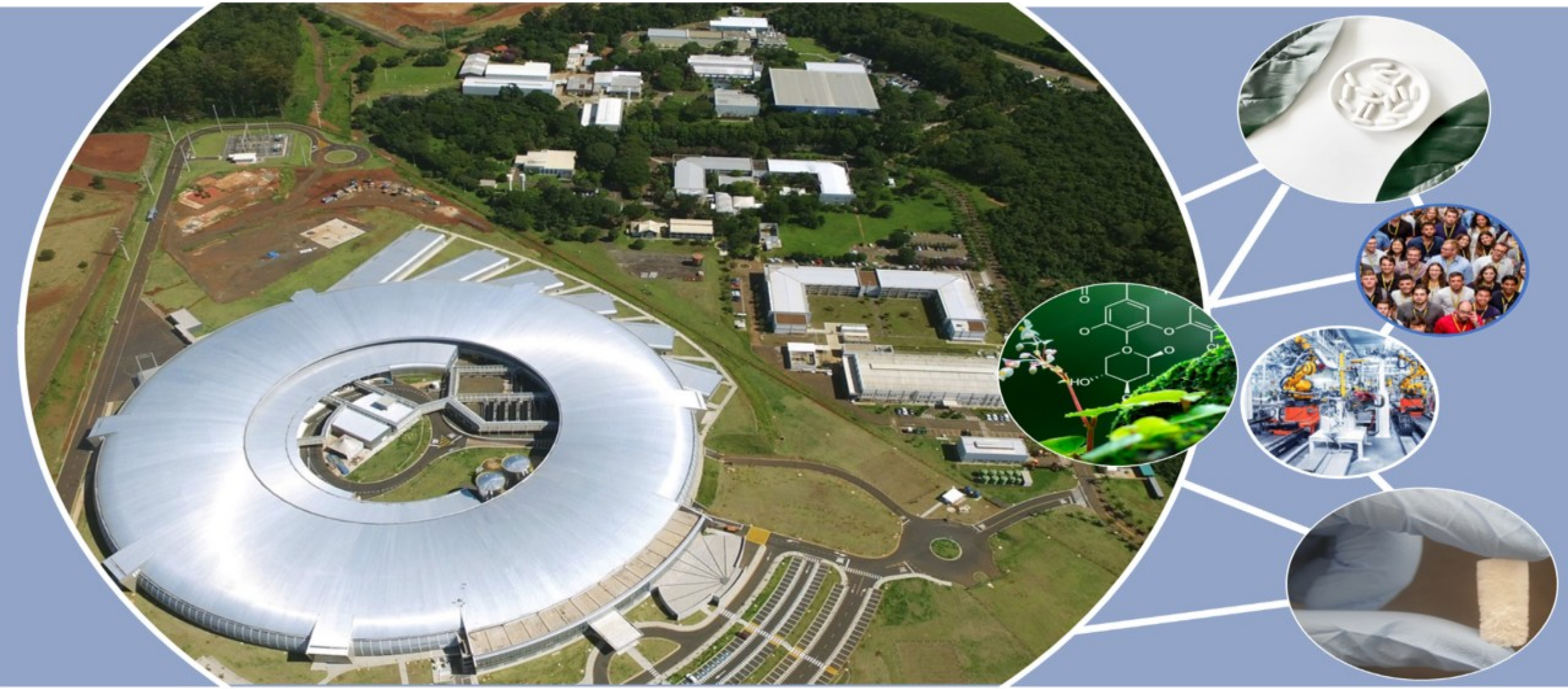
CNPEM – Brazilian Research Center in Energy and Materials



Antonio José Roque da Silva
Director General - CNPEM
jose.roque@cnpem.br

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GOVERNO DO BRASIL DO LADO DO POVO BRASILEIRO

CNPEM – Brazilian Research Center in Energy and Materials

SIRIUS | Brazilian Synchrotron Light Laboratory (LNLS)

General Directorate

Brazilian Biorenewables National Laboratory (LNBR)

Brazilian Biosciences National Laboratory (LNBio)

Engineering and Instrumentation Laboratories

Brazilian Nanotechnology National Laboratory (LNNano)

Human Resources

Emplyees – 1.250
Students, PosDocs– 320
Trainess – 130
Outsourced Personnel - 280

TOTAL | 1.980

Ilum School of Sciences

CNPEM is a private, non-profit organization overseen by the Brazilian Ministry of Science, Technology, and Innovation (MCTI)

CNPEM Campus

Important Turning Point in the Brazilian Science - “Big facility”, in house development

A pioneering lab in Brazil

First synchrotron light source in the southern hemisphere

Around 85% built in house

Built between 1987-1997

Training of human resources

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But not competitive at an international level...

Sirius – a competitive synchrotron light source – 4th generation

Sirius: CNPEM and Brazilian Industry Collaboration

Since the very beginning of the Project, we understood that it was essential the involvement of Brazilian companies. With the support of Fapesp, we have tried to create a **Public Procurement of Innovation (Encomenda Tecnológica)** model.

Workshop: Parcerias Sirius

*28 de junho de 2013, Campinas, São Paulo **(nova data)***

LNLS + sirius

O Laboratório Nacional de Luz Síncrotron (LNLS) convida a sua empresa para participar do **Workshop: Parcerias Sirius**, a ser realizado no próximo dia 28 de junho, em Campinas - SP. O evento tem o objetivo de apresentar os desafios tecnológicos envolvidos na construção da nova fonte de luz síncrotron brasileira – Projeto Sirius – e buscar empresas para o desenvolvimento e fabricação de seus componentes, equipamentos e sistemas. Sirius foi projetado para ser uma das mais avançadas fontes de luz síncrotron do mundo.

O Projeto, de R$ 650 milhões, será financiado pelo Ministério da Ciência, Tecnologia e Inovação (MCTI), agências de fomento e outras instituições.

Buscamos parceiros com expertise em:

- Controle de Automação
- Controle e Supervisão de Dados
- Eletrônica
- Eletrônica de Potência
- Materiais
- Mecânica
- Mecânica de Precisão
- Óptica
- Rádio Frequência (RF)
- Robótica
- Transferência de Calor
- Ultra Alto Vácuo

Workshop: Parcerias Sirius
Data: 28 de junho de 2013, a partir das 8h30 **(nova data)**.
Local: Auditório do Anel Síncrotron (LNLS)

É imprescindível a confirmação dos participantes via email: *parceiros.sirius@lnls.br*
Mais informações em: *lnls.cnpem.br/parceirossirius*

CNPEM

O LNLS integra o CNPEM, Organização Social qualificada pelo MCTI
Site: *lnls.cnpem.br*

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08:30	**Credenciamento Empresas**
09:00	**Apresentação Geral Projeto Sirius**
	Antonio José Roque da Silva *(Diretor Laboratório Nacional de Luz Síncrotron)*
09:30	**Cerimônia de Lançamento das Parcerias Sirius**
	Pedro Wongtschowski *(Presidente do Conselho de Administração do CNPEM)*
	Carlos Alberto Aragão de Carvalho Filho *(Diretor-Geral do CNPEM)*
	Antonio José Roque da Silva *(Diretor Laboratório Nacional de Luz Síncrotron)*
	Carlos Henrique de Brito Cruz *(Diretor Científico da FAPESP)*
	Luiz Antonio Rodrigues Elias *(Secretário Executivo do MCTI)*
	Assinatura de Protocolo de Cooperação - WEG
11:10	**Coffee Break**
11:30	**Workshop Parcerias Sirius - Parte 1**
Desafios:	1. Máscara para Linha de Luz *(Harry Westfahl)*
	2. Fendas Monocromáticas para Linha de Luz *(Harry Westfahl)*
	3. Gamma Shutter *(Harry Westfahl)*
	4. Photon Shutter *(Harry Westfahl)*
	5. Porta Amostras para Experimentos *(Harry Westfahl)*
	6 . Hutch (Cabana para Experimentos) *(Harry Westfahl)*
12:30	**Visita à Fonte de Luz Síncrotron**
13:00	**Almoço**
14:00	**Workshop Parcerias Sirius - Parte 2**
Desafios:	7. Equipamentos de Conectividade *(Guilherme Franco)*
	8. Single Board Control *(Guilherme Franco)*
	9. Peripheral Unit *(Guilherme Franco)*
	10. RF Front End *(Sérgio Marques)*
	11. FMC Digitizer *(Sérgio Marques)*
	12. Digital Back End *(Sérgio Marques)*
	13. Eletrônica de Detector de Posição de Fótons *(Sérgio Marques)*
	14. Fontes de Corrente de Baixa Potência *(Cléber Rodrigues)*
	15. Fontes de Corrente de Alta Potência *(Cléber Rodrigues)*
	16. Módulos de Regulação Digital de Fonte *(Cléber Rodrigues)*
	17. Cabos *(Cláudio Pardine)*
15:05	**Coffee Break**
16:05	**Workshop Parcerias Sirius - Parte 3**
Desafios:	18. Válvulas All Metal para Vácuo *(Rafael Seraphim)*
	19. Câmaras Metálicas para Ultra Alto Vácuo *(Rafael Seraphim)*
	20. Câmaras de Elementos Ópticos em Vácuo *(Rafael Seraphim)*
	21. Berços *(Regis Terenzi)*
	22. Trem de Monitoramento de Túnel *(Regis Terenzi)*
	23. Mecânica dos Medidores de Posição dos Elétrons *(Osmar Bagnato)*
	24. Planta de Fornecimento de Nitrogênio *(Álvaro Cerone)*
	25. Planta de Fornecimento de Hélio *(Álvaro Cerone)*
	26. Combinadores de Amplificadores de RF *(Cláudio Pardine)*
	27. Sistema de Guias de Onda *(Cláudio Pardine)*
	28. Centrais de Interlock *(James Citadini)*
	29. Monitores Fluorescentes *(Sérgio Marques)*
17:25	**Encerramento**

It didn't work out because FAPESP couldn't pay salaries to the companies' employees...

05/09/2014 - Finep and FAPESP launched a public call for proposals from companies interested in participating as suppliers in the construction of Sirius.

FAPESP
FUNDAÇÃO DE AMPARO À PESQUISA DO ESTADO DE SÃO PAULO

Índice

Buscar

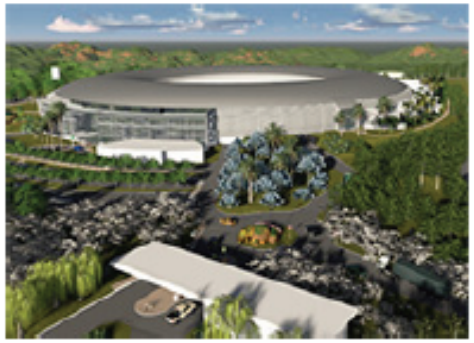
Página inicial » Notícias

Empresas que participarão do desenvolvimento do Sirius são selecionadas

A FAPESP e a Financiadora de Estudos e Projetos (Finep) anunciam o resultado da seleção pública para o desenvolvimento do novo anel acelerador Sirius, do Laboratório Nacional de Luz Síncrotron (LNLS).

O objetivo da chamada de propostas é apoiar o desenvolvimento, por empresas paulistas, de produtos, processos e serviços inovadores para o Sirius.

Sirius, uma das primeiras fontes de luz síncrotron consideradas de 4ª geração, é composto por um acelerador síncrotron de 3 GeV e 0.28 nm radiano de emitância. Essa nova fonte terá brilho comparável ou melhor do que todas aquelas em construção ou recentemente construídas nas Américas, Europa e Ásia, permitindo que o Brasil se mantenha competitivo pelos próximos 20 anos.



FAPESP e Finep aprovam 13 propostas para anel acelerador no LNLS (*imagem: LNLS*)

O Edital FAPESP-Finep incentiva que pequenas empresas em São Paulo encetem pesquisas para atender a desafios científicos e tecnológicos especificados pela equipe de projeto do Sirius, viabilizando tais empresas como potenciais fornecedores de partes, peças, e serviços que requerem tecnologia avançada em seu desenvolvimento.

08/07/2015

It was a good idea, but it didn't end up being as successful as expected...

Even so, a second call was lauched in august of 2015, with the final selection announced in december of 2016

Too slow and not flexible enough for the necessities of the project

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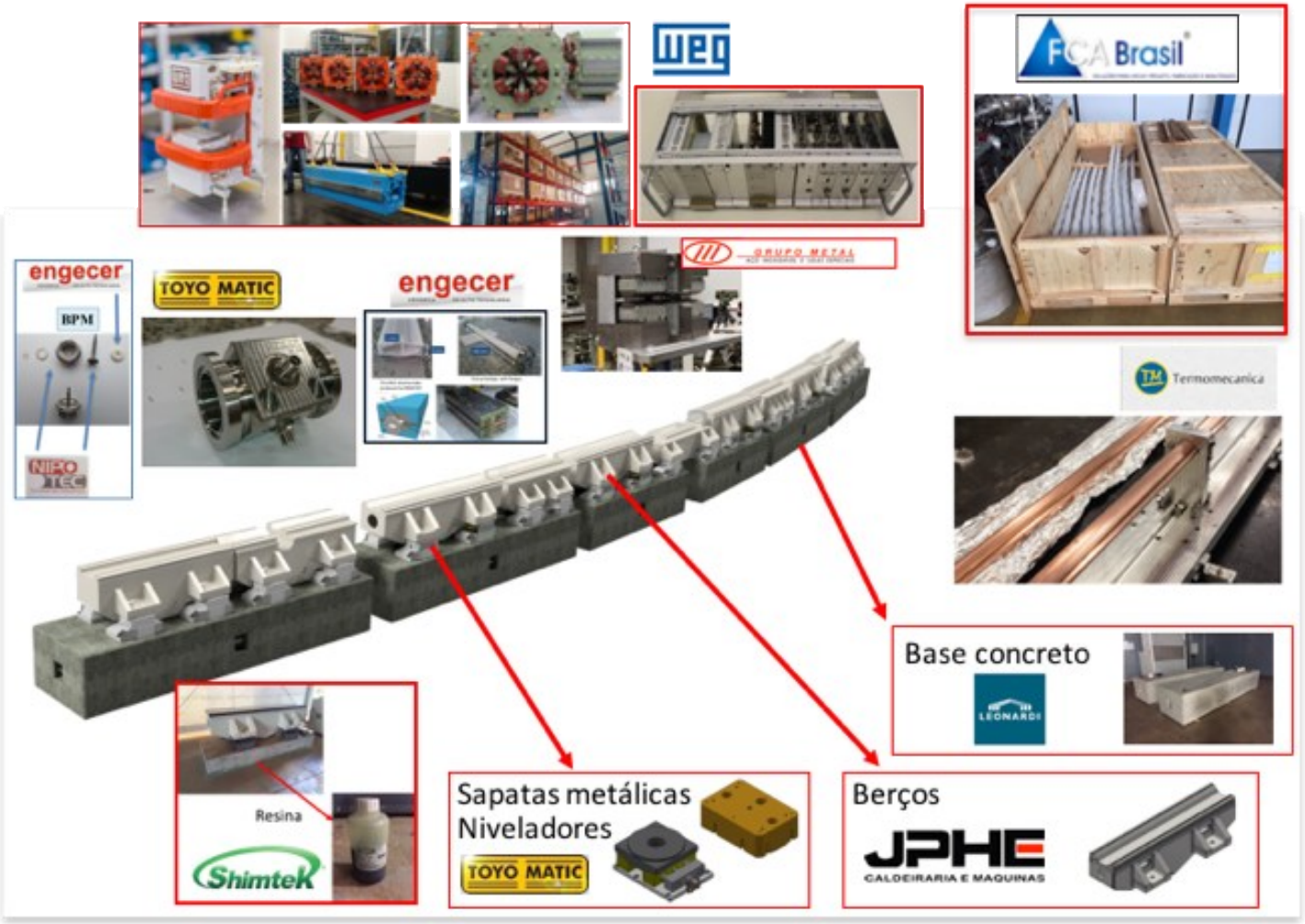
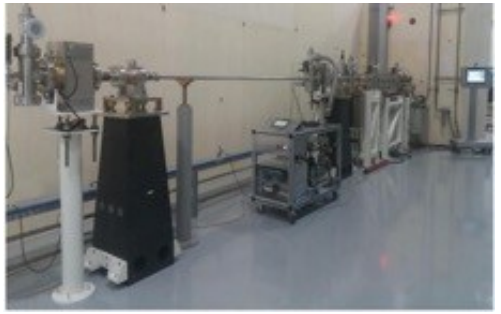
Interaction with innovative Brazilian companies in product/process/production developments for Sirius



BIOTEC



FCA Brasil

Agreement between PITEC and CNPEM advances the development of state-of-the-art technology

THANKS TO THE INVOLVEMENT OF THE BRAZILIAN COMPANIES, THE PROJECT ACHIEVED A > 80% INDEX OF NATIONALIZATION

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Success case: Magnets for Sirius

1036 eletromagnets

- 257 in the Booster Ring
- 782 in the Storage Ring

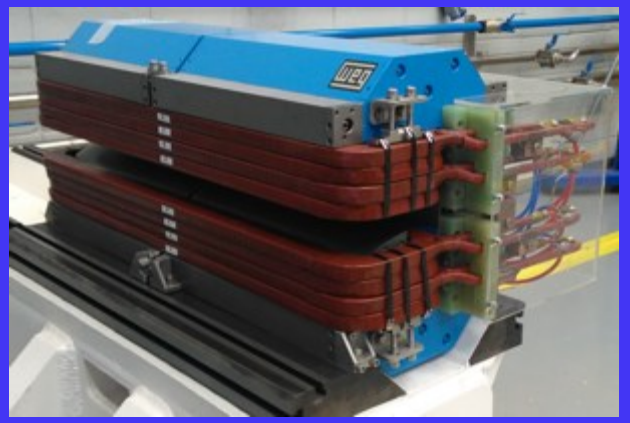
Divided into:

- Corrector
- Quadrupoles
- Sextupoles
- Dipoles

Success case: Magnets for Sirius

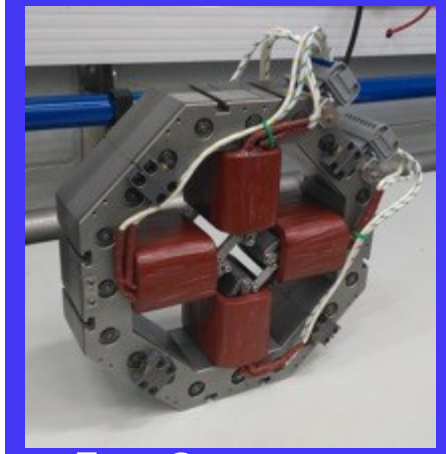
WEG manufactured the Sirius accelerator electromagnets, a **non-standard, high-precision product for the company**.

More than 1,000 magnets were built and installed.

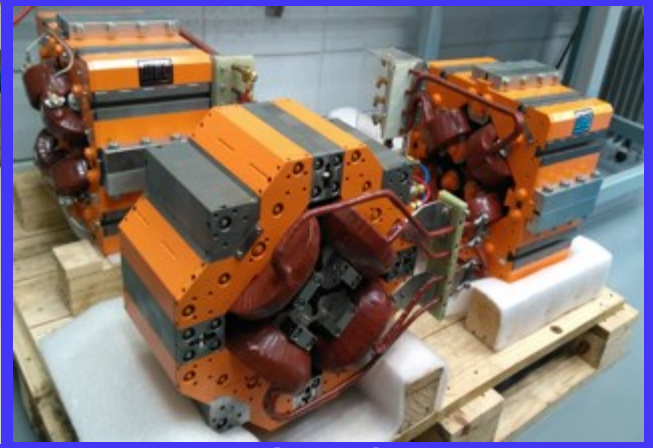


Storage Ring Electromagnetic Dipole

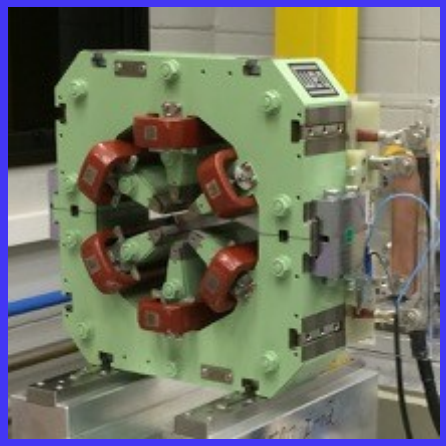
Booster Dipole



Fast Corrector



Quadrupoles



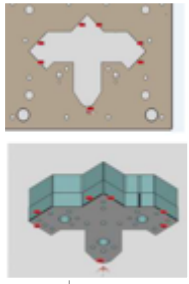
Sextupole

Sirius Magnets Development Process

Sirius Electromagnets → External Manufacturer (WEG)

Design

- Simulation, mechanical design and project specification



Prototype

- Validate design/simulations
- Develop process

Pilot Batch

- Adjust design/product

Serial Batch

- Serial production at scale

Validation

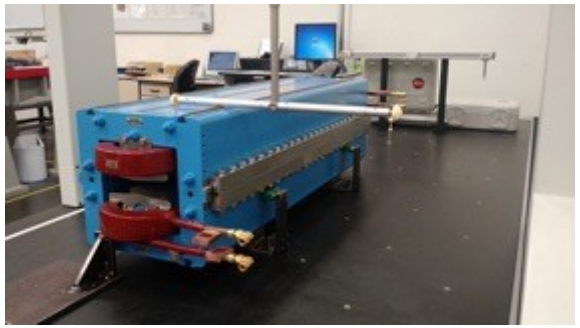
- Magnetic measurements
- Metrology

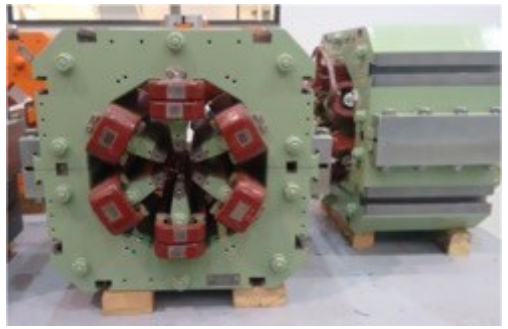
Magnets for Sirius

WEG - Jaraguá do Sul, SC, Brazil

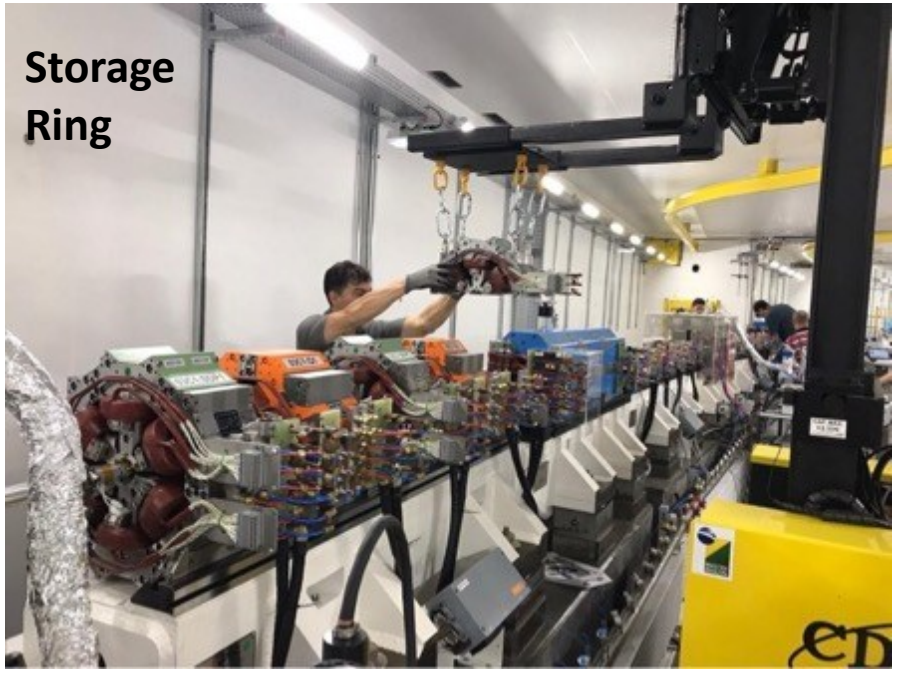
Special room for magnets´ assembly at WEG

Booster





Storage Ring



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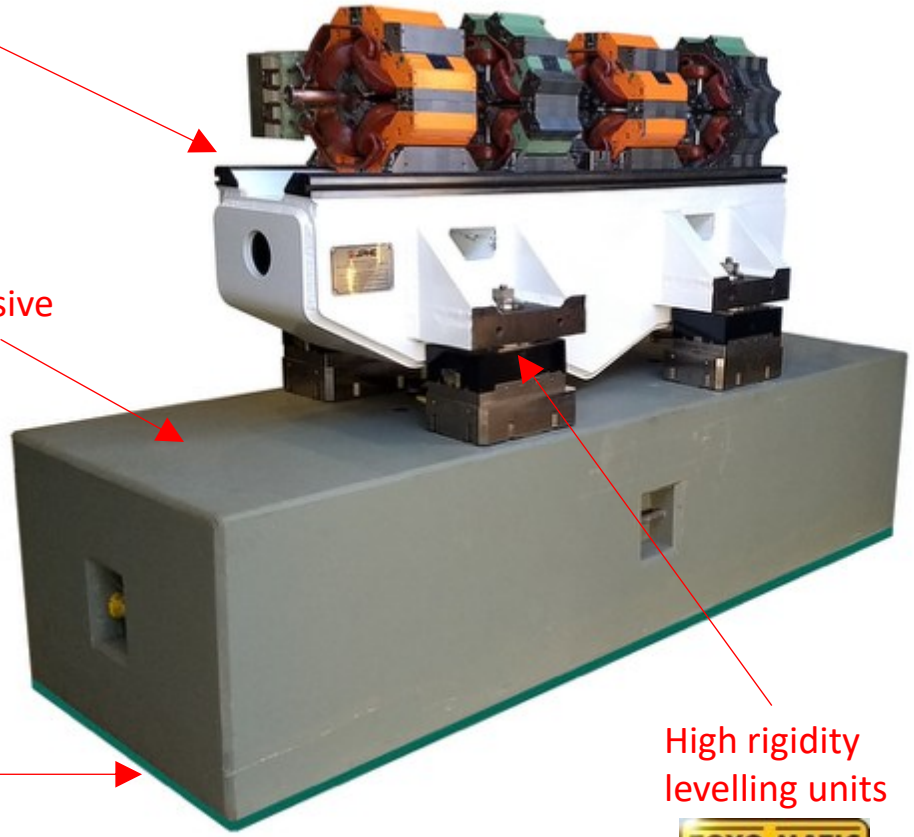
High Stability Girder

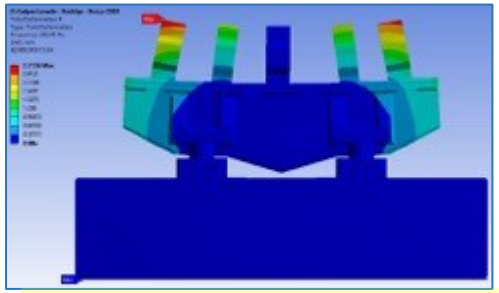
10 micrometer flatness girder

100 MPa compressive strength concrete

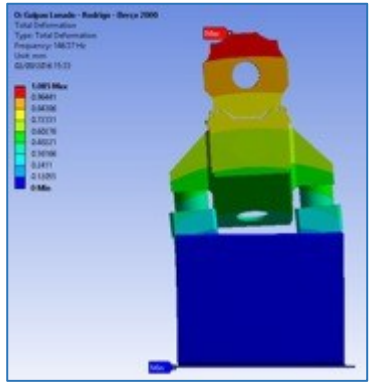
5 GPa compressive strength resin



High rigidity levelling units



V 1st mode: 268 Hz



H 1st mode: 152 Hz

Multipole Magnets aligned by mechanical definition using reference surfaces of magnets and girder

idea
R&D services in
photonics and microelectronics

BrPHOTONICS
LASERs, optical and
photonic devices

πtec
Imaging and communication
Customized products

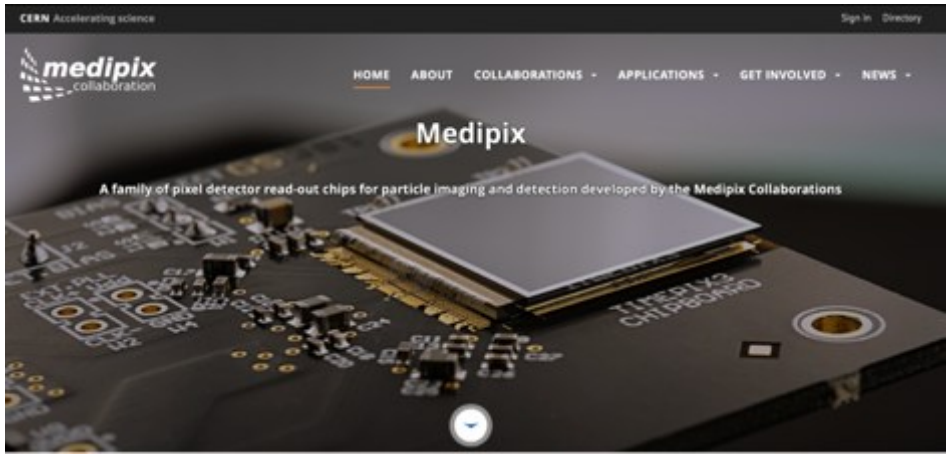
With the participation of Eldorado

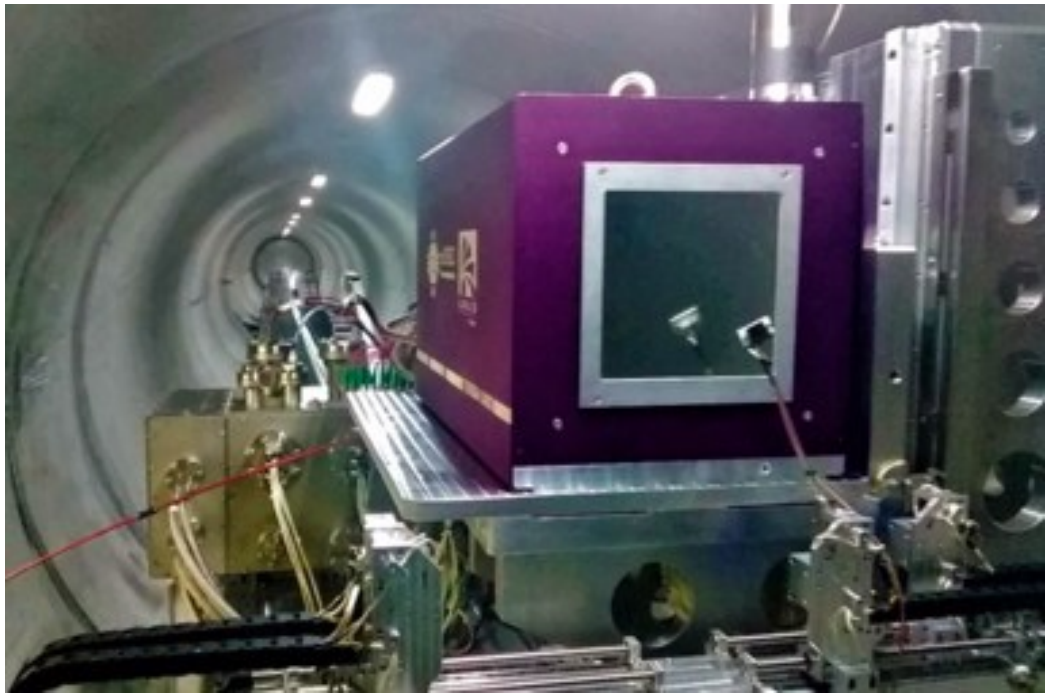
/ PIMEGA and CNPEM partnership

- PIMEGA is a complete line of X-Ray Detectors developed in a **CNPEM and PITEC partnership**
- Designed for materials science experiments in the Sirius project, they can also be used for laboratory applications
- High speed electronics; precision mechanics; vacuum compatibility; complex assembly integration

CNPEM

CERN





CERN Cooperation and Opportunities in Brazil

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Associate Member State of CERN

- Since March 2024, Brazil is an **Associate Member State of CERN**, the first in South America.

- Brazil is an Associate Member of CERN, unlocking access for Brazilian companies, now **eligible to bid for CERN contracts.**

- CNPEM supports the Industrial Liaison Officer - ILO activities

Procurement and Industrial Services Group

Who to Contact in Your Country

Brazil

Rafael Navarro

Organization
CNPEM

Address
Polo II de Alta Tecnologia - R. Giuseppe Máximo Scolfaro, 10000 - Campinas - SP, 13083-100, Brazil

Telephone
+5511972814717

Email
rfabran@gmail.com

Industrial Liaison Officers (ILO's) are appointed by CERN's Member States to facilitate the flow of communication between CERN and its suppliers. ILO's can provide advice on the opportunities available for doing business with CERN and the support available to firms in their local regions.

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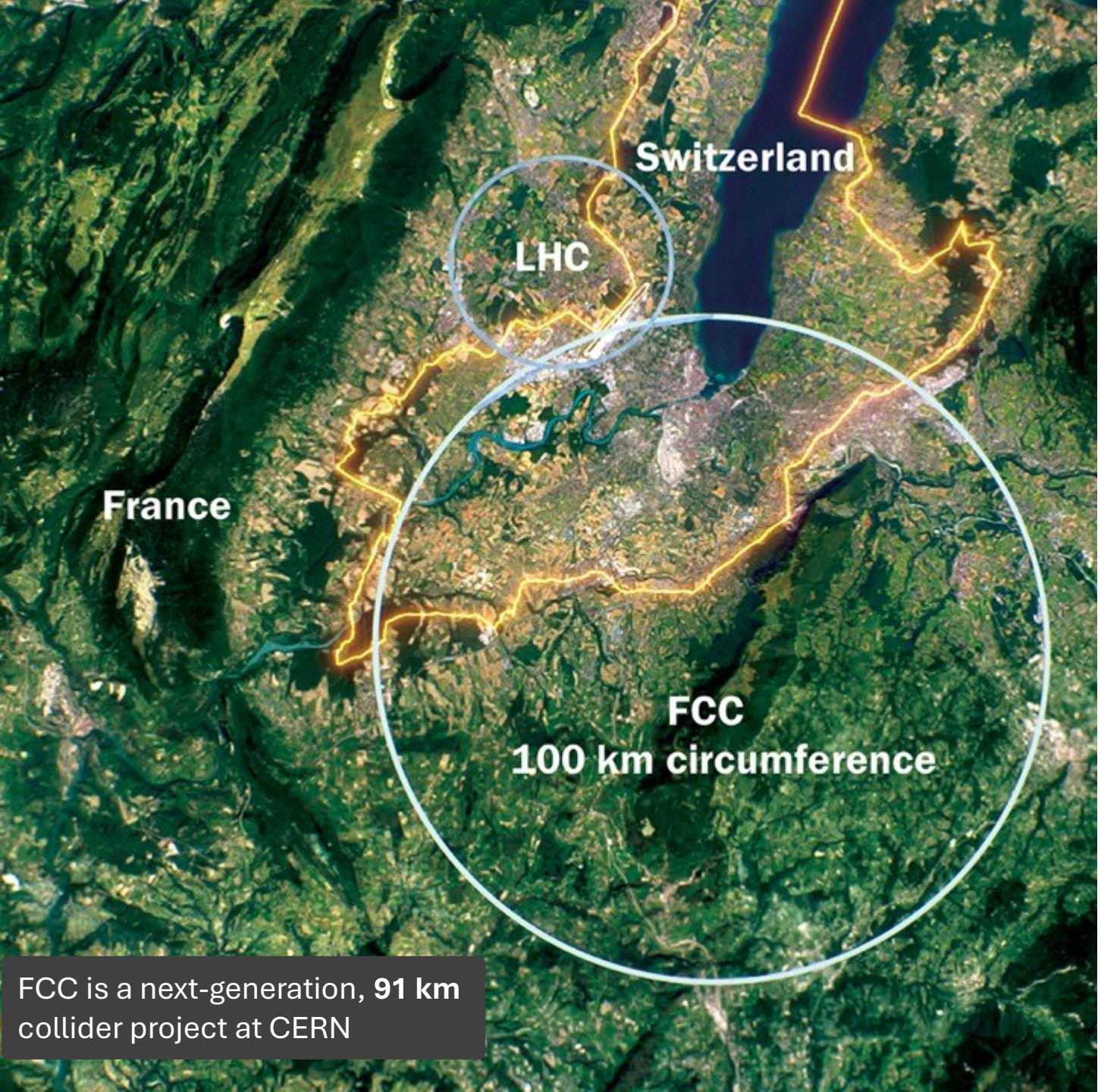
Partnering with CNPEM

How CNPEM de-risks:

- CNPEM operates as a private, non-profit research ICT**, supervised and financed by MCTI,** with open, multi-user facilities and engineering and scientific teams that **co-develop solutions with companies and other ICT´s**.
- Accredited **EMBRAPII Unit** since 2014, enabling agile contracting and non-reimbursable co-funding for corporate RD&I projects.
- **Co-development, prototyping, and qualification** using CNPEM **infrastructure and expertise**. Innovation support covers **tech transfer/licensing**, advanced **technology services**, **scale-up**, and a Deeptech **acceleration program**.



FCC is a next-generation, **91 km** collider project at CERN

FCC

- Two stages
  - FCC-ee (precision measurements) about 15 years from the late 2040s
  - FCC-hh (high energy) about 25 years from the 2070s
- The FCC team is conducting the **feasibility analysis** and advancing the **conceptual design**.
- The **large scale** and duration of FCC open **unprecedented opportunities for Brazilian companies** across magnets, cryogenics, vacuum, power systems, precision mechanics, and controls.

FCC

- Two stages
  - FCC-ee (precision measurements) about 15 years from the late 2040s
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- The FCC team is conducting the **feasibility analysis** and advancing the **conceptual design**.
- The **large scale** and duration of FCC open **unprecedented opportunities for Brazilian companies** across magnets, cryogenics, vacuum, power systems, precision mechanics, and controls.

- **In particular, the transfer lines will require a large number of high-quality dipoles, quadrupoles and correctors.**

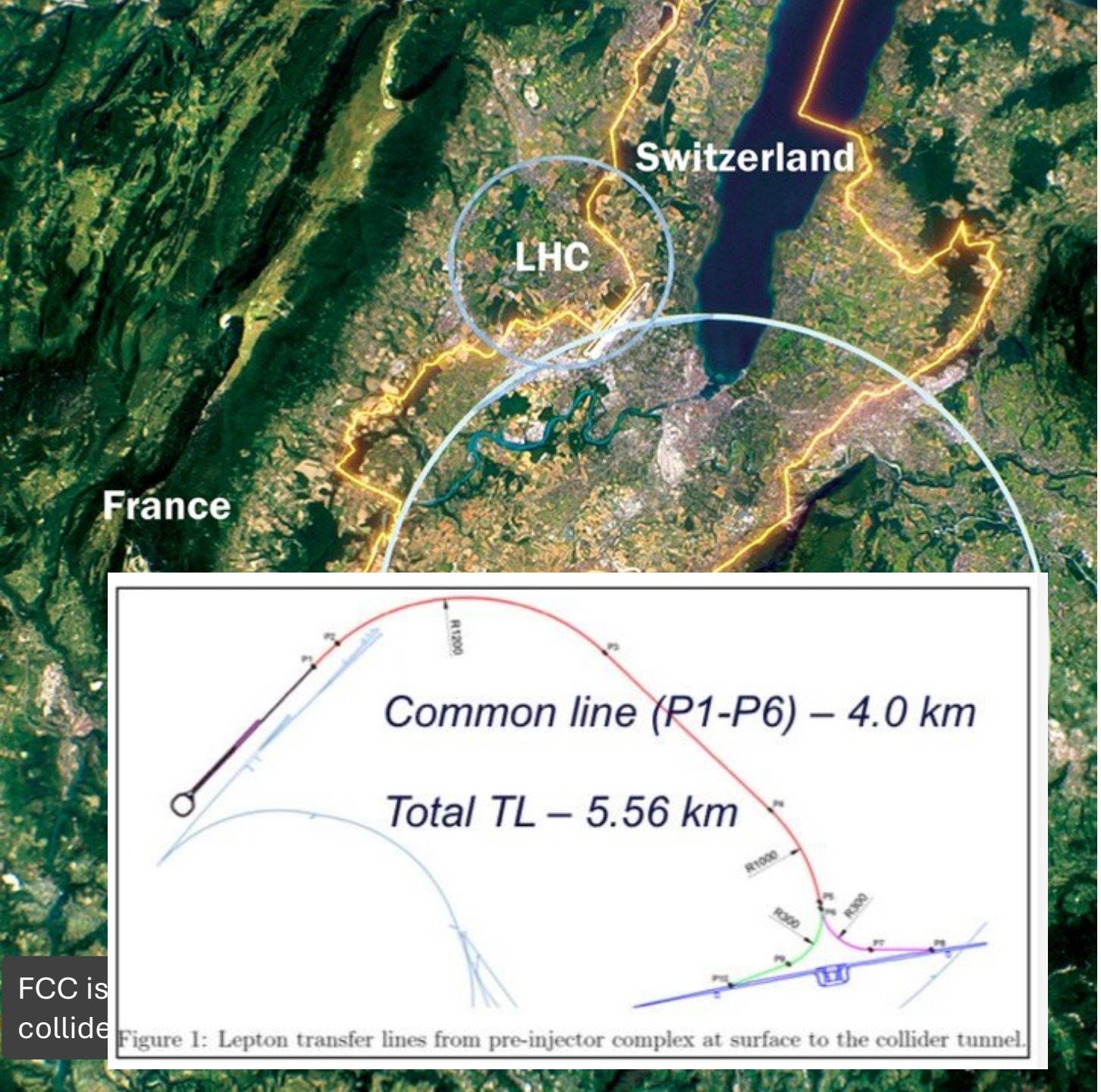

Figure 1: Lepton transfer lines from pre-injector complex at surface to the collider tunnel.

FCC is
collide

Reference: *Future Circular Collider Feasibility Study Report, March 2025*

	Unit	Quadrupoles	Dipoles	Correctors
Total number		338	286x6=1716	224
# magnets in common line		162	192x6=1152	108
Length	m	1	1	tbd

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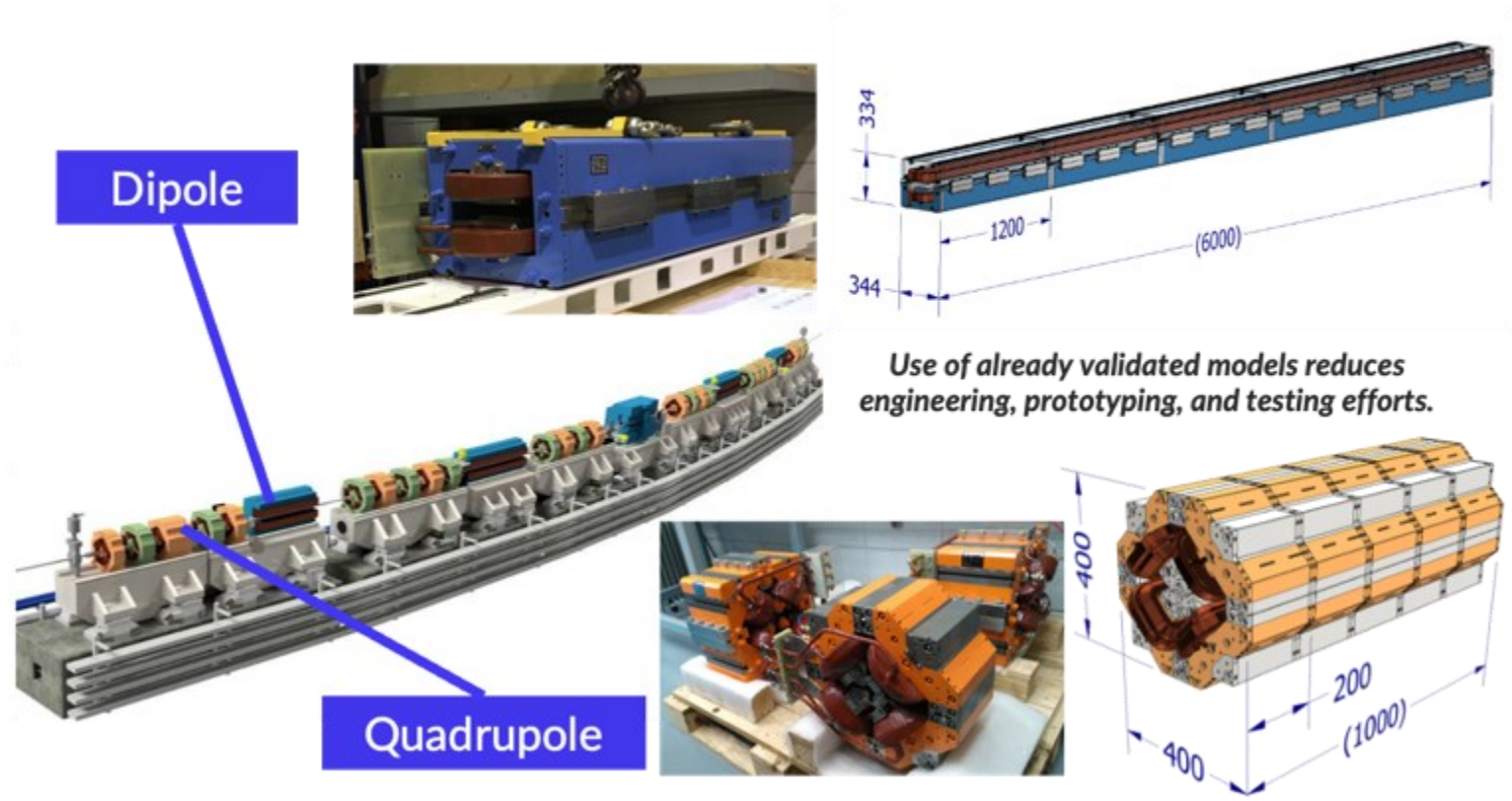
CNPEM's Proposal for FCC-ee Transfer Line

The proposal centers on **adapting the existing Sirius magnets for the FCC project**, leveraging models already produced and validated.

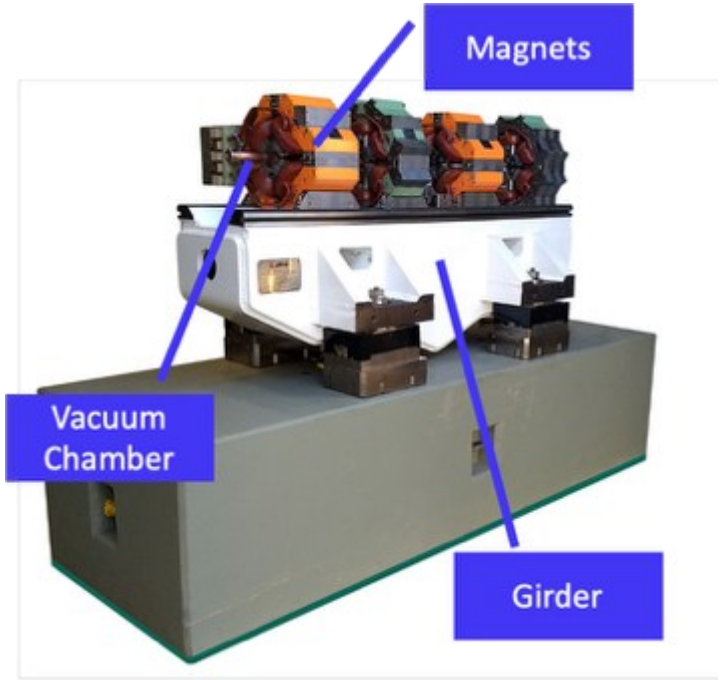
Minor modifications have to be implemented to ensure full compatibility with FCC-CERN specifications, aligning performance parameters and engineering requirements.

Key advantages include a significant **reduction in development effort**.

This approach **accelerates delivery timelines** and streamlines project execution for FCC-CERN.



Use of already validated models reduces engineering, prototyping, and testing efforts.



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Thank you

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