Welcome to ESLS XXXIII

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Synchrotron SOLEIL

33rd European Synchrotron Light Source Workshop, 30 and 31 October 2025

We last hosted ESLS workshop in 2006!

SOLEIL and its Local Environment

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A Few Figures…

Statuts

- *On 16 October 2001, the CNRS and the CEA established a non-profit civil company, Synchrotron SOLEIL, which was responsible for overseeing the construction and subsequent operation of SOLEIL. They respectively hold 72% and 28% of the shares. The region Île de France and the Departmental Council of Essonne have also provided €183 million in funding. The Centre region is likewise a partner in SOLEIL.*

Staff

- 358 permanent posts
- 30 nationalities

~ 15 postdocs
~ 10 PhD positions
~ 50 trainees

+

~ 30 cofinanced PhDs
~ 100 associated researchers

Budget

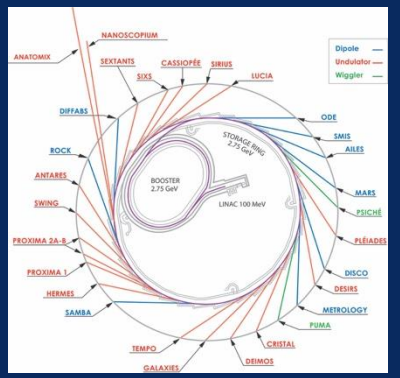
Investment Budget (2002-2012)
~ 634 M€

Annual Budget
~ 65 M€

72% **28%**

Infrastructure & operation

- Storage ring: 354m, 2.75GeV
- 29 beamlines + 1 Cryo-EM
- 24/7 operation ~ 98.5% reliability
- 5019 hours of beamtime / year



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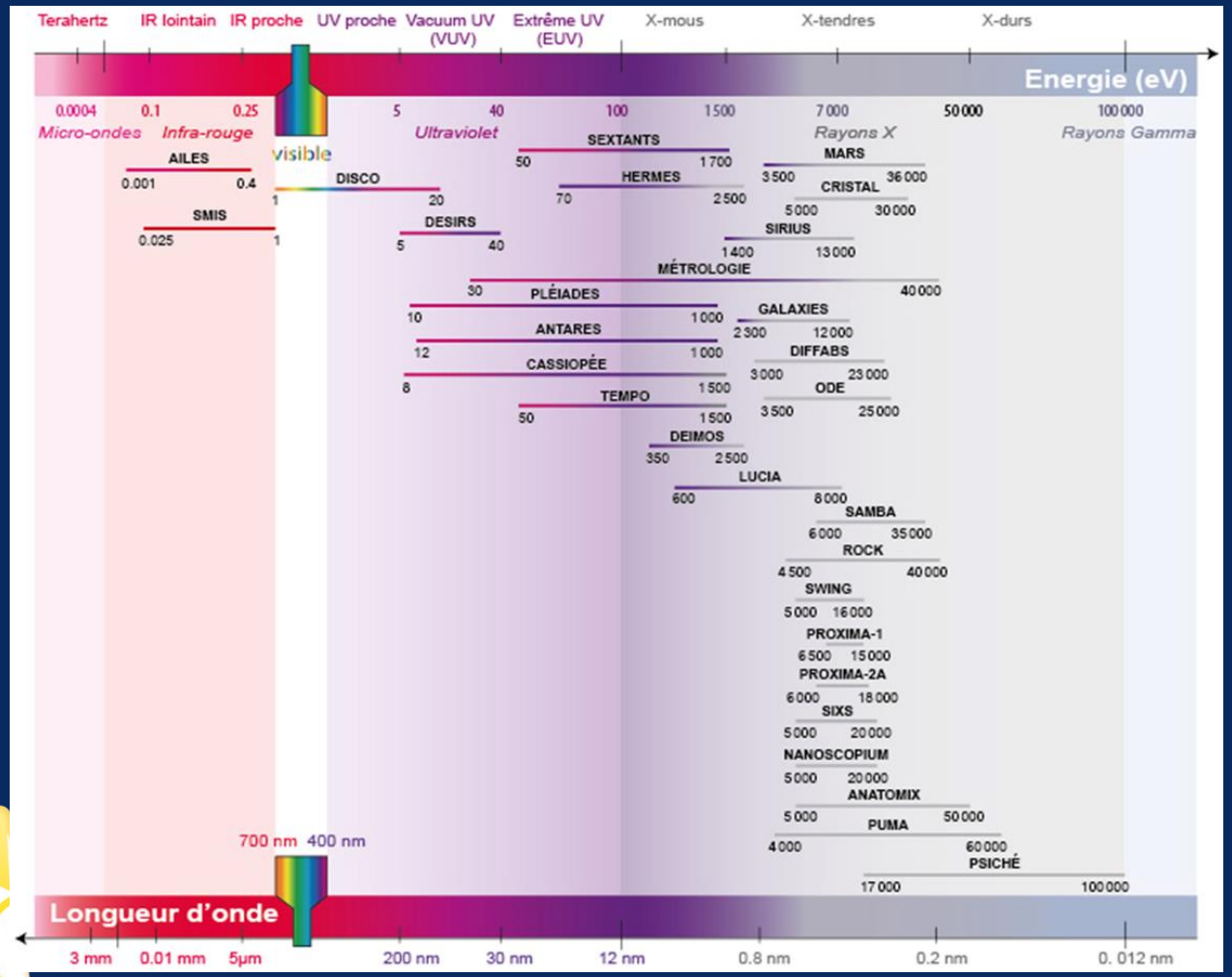
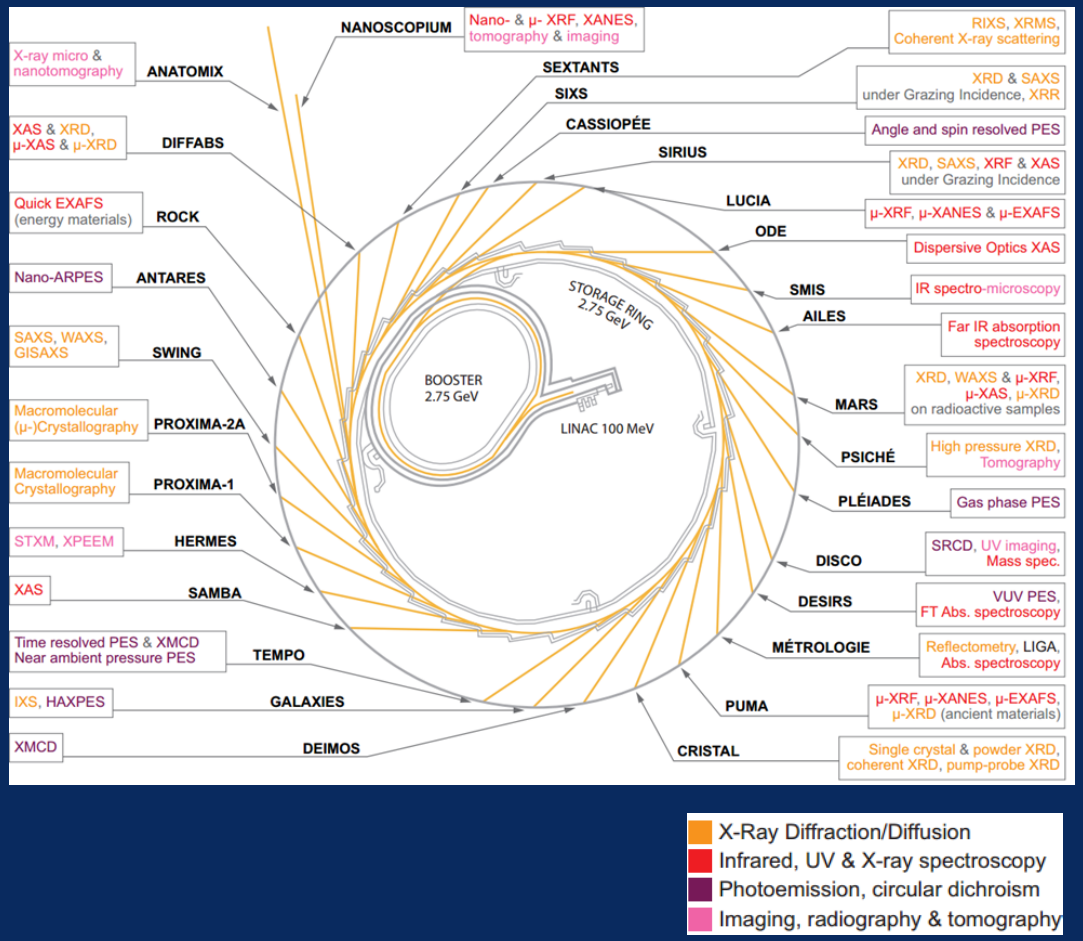
Synchrotron SOLEIL Specificities

A broad spectral range



A wide variety of characterization methods



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SOLEIL at a Glance

- 1500 submitted proposals, 600 accepted
- 3000 users from 900 labs
- 600 remote access
- 170 projects with industry

- 700 publications (~ 10000 since 2008)
- 150 IF > 9
- 100+ multi-beamlines projects

User service

Cutting-edge SR research

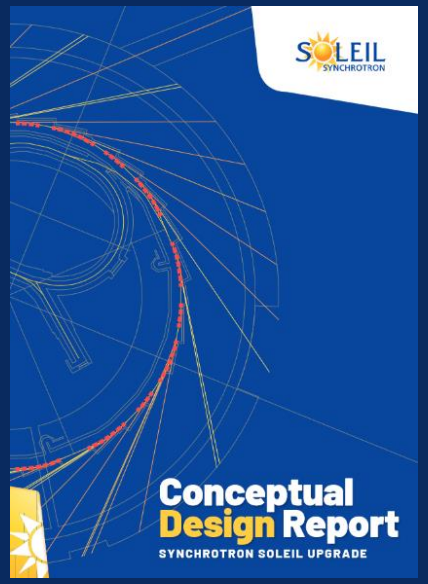
State-of-the-art instrumentation

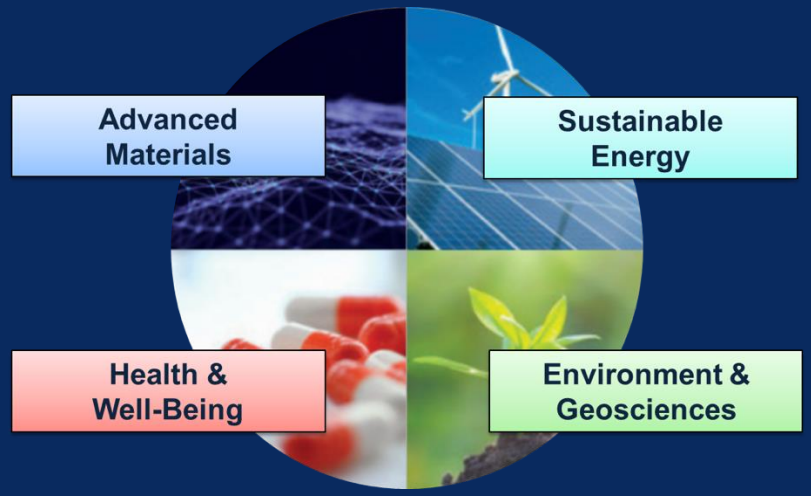
Social Commitment, education and outreach

- 180 scientific partnerships
- 50+ ANR projects
- ~ 10 technology transfers to SMEs
- 14 patents

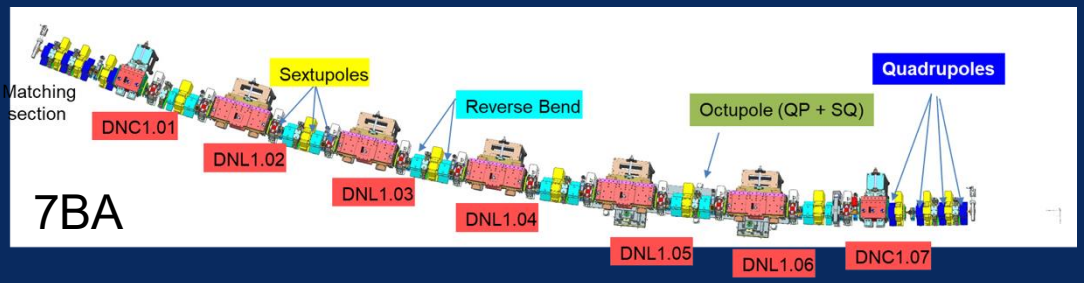
- SOLEIL partner of 66 universities
- 90% of the projects involve PhD thesis
- 4000 visitors (30 000 visitors since 2010)
- 30 trainees and apprentices

SOLEIL II Project at a Glance



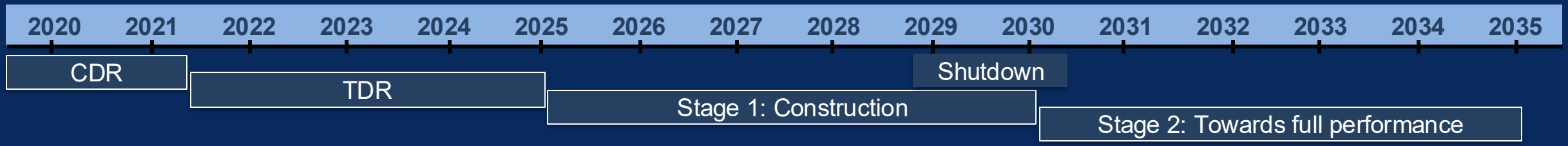


https://www.synchrotron-soleil.fr/en/news/conceptual-design-report-soleil-upgrade



Non-standard MBA lattice:
12 x 7BA + 8 x 4BA (20 cells)

85 pm.rad (+ matched β-functions)
500 mA / 354 m / 2.75 GeV



Budget
~ 309 M€

Stage 1 (6 years): ~ 186 M€
Stage 2 (5 years): ~ 123 M€

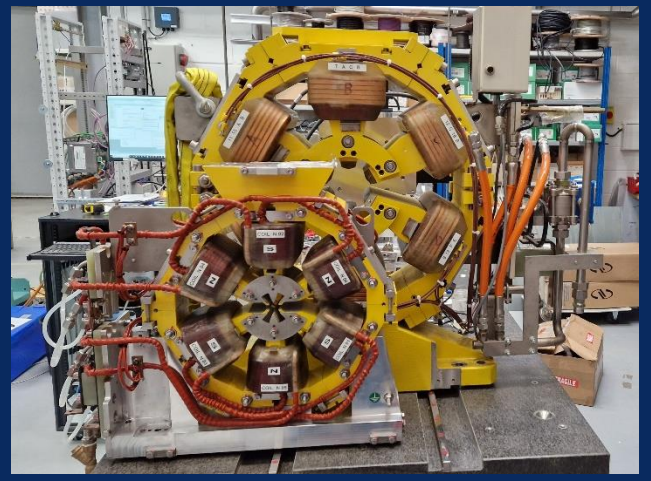
SOLEIL II Machine Key Features

- 85 pm.rad (+ matched β-functions) / 500 mA / 354 m / 2.75 GeV
- Non-standard MBA lattice: 12 x 7BA + 8 x 4BA (20 cells)
- Quadrupole (120 T/m) and Sextupole (8500 T/m^2): bore diameter = 16 mm
- NEG coated very small vacuum chamber diameter (12 mm)
- Extensive use of permanent magnets (all dipoles, RB and main quadrupoles)
- Off-axis injection
- Innovative high performance Multipole Injection Kicker (MIK)
- 22 straight sections (7 different lengths)
- Maintaining the broad energy range (far IR to hard X-rays)
- Energy savings and reduced energy footprint

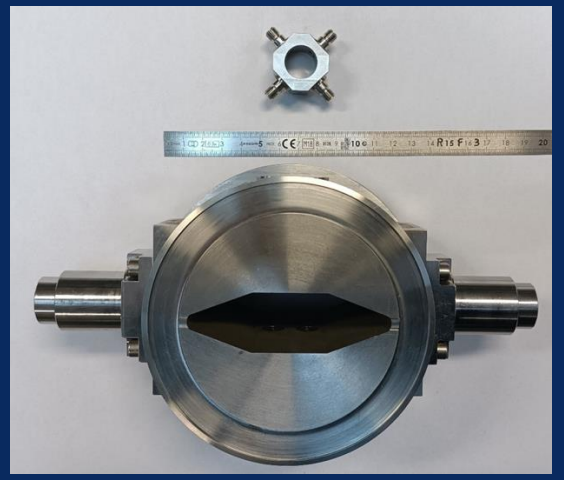
Table 1: Comparison of the Main Bare Lattice Parameters	Present	SOLEIL II V3631 w/o super-bends
H-Emittance (2.75 GeV)	4 nm.rad	85 pm.rad
Circumference	354.10 m	353.98 m
Straight section number	24	20
Long straight length	12.00 m	8.05 / 2*3.9 m
Medium straight length	7.00 m	3.79 / 4.26 m
Short straight length	3.80 m	3.19 m
Straight length ratio	46 %	25 %
Betatron tunes H/V	18.16 / 10.2	54.2 / 18.3
Mom. comp. factor	4.18 10^{-4}	1.07 10^{-4}
RMS energy spread	0.102 %	0.087 %
Energy loss per turn w/o IDs	917 keV	462 keV
Damping times x/z/s (ms)	3.3/3.3/6.6	7.9 /14 /11.8
RMS nat. bunch length	15.2 ps	8.7 ps
RF main cavity voltage	2.8 MV	1.7 MV

Miniaturization!

Quadrupole SOLEIL/SOLEIL II



Sextupole SOLEIL/SOLEIL II



BPM vacuum chamber SOLEIL/SOLEIL II

Dipole Arc Vacuum chamber SOLEIL/SOLEIL II

Storage Ring RF plant 4 x 190 kW power amplifiers

Unique in the world in 2006

Today, it has become the preferred choice for most synchrotron radiation sources.

SOLEIL SYNCHROTRON

Thank you very much for your attention !

I hope you enjoy the workshop and your stay

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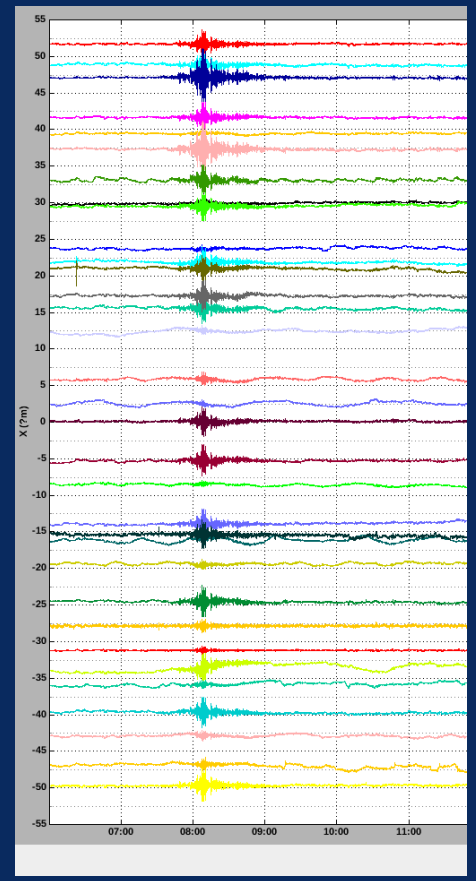
The Beam as Seismograph!: 7 Earthquakes Recorded in 2025

ROUX Guillaume	AUTRE	Tremblement de terre M7.6 Passage de Drake	12/oct./25	0h 35min	10/oct./25 23:25	11/oct./25 00:00	Tremblement de terre de magnitude 7.6 Passage de Drake à 22:29 (UTC+02:00) L'onde a mis environ 1 heure (23h25) pour que l'on voie les premiers effets arriver sur Soleil (13400 km en surface). On observe des amplitudes max d'oscillation (pic/pic) sur SMIS et MARS dans le plan horizontal de ~1,6µm
ROUX Guillaume	AUTRE	Tremblement de terre M7.4 Philippines	12/oct./25	0h 25min	10/oct./25 04:40	10/oct./25 05:05	Tremblement de terre de magnitude 6.7 Philippines à 03:44 (UTC+02:00) L'onde a mis environ 50min (04h35) pour que l'on voie les premiers effets arriver sur Soleil (11257 km en surface). On observe des amplitudes max d'oscillation (pic/pic) sur SMIS et MARS dans le plan horizontal de ~2,6µm
ROUX Guillaume	AUTRE	Tremblement de terre M6.9 Philippines	01/oct./25	0h 24min	30/sept./25 16:53	30/sept./25 17:17	Tremblement de terre de magnitude 6.9 Philippines à 15:59 (UTC+02:00) L'onde a mis environ 54min (16h53) pour que l'on voie les premiers effets arriver sur Soleil (11257 km en surface). On observe des amplitudes max d'oscillation (pic/pic) sur SMIS et MARS dans le plan horizontal de ~1,09µm
ROUX Guillaume	AUTRE	Tremblement de terre M7.8 Péninsule Russe du Kamtchatka	18/sept./25	0h 43min	18/sept./25 21:36	18/sept./25 22:19	Tremblement de terre de magnitude 7.4 Péninsule russe du Kamtchatka (128 km à l'est du port russe de Petropavlovsk-Kamtchatsky) à 20:58:12 (UTC+02:00) L'onde a mis environ 12min pour que l'on voit les premiers effets arriver sur Soleil (8500km). On observe des amplitudes max d'oscillation (pic/pic) sur SMIS et MARS dans le plan horizontal de ~3,5µm
ROUX Guillaume	AUTRE	Tremblement de terre M7.4 Péninsule Russe du Kamtchatka	13/sept./25	0h 15min	13/sept./25 05:25	13/sept./25 05:40	Tremblement de terre de magnitude 7.4 Péninsule russe du Kamtchatka (111 km à l'est du port russe de Petropavlovsk-Kamtchatsky) à 04:37:54 (UTC+02:00) L'onde a mis environ 1h pour arriver sur Soleil (8500km). On observe des amplitudes max d'oscillation (pic/pic) sur SMIS et MARS dans le plan horizontal de ~1,7µm
JEANGERARD Damien	AUTRE	Tremblement de terre M7.4 Péninsule Russe du Kamtchatka	20/juil./25	0h 35min	20/juil./25 09:30	20/juil./25 10:05	**Seisme à Loujno-Sakhalinsk (russie) de magnitude 7,4**, visible sur les correcteurs et sur la position du faisceau dans l'anneau de **9h30 a 10h05** déplacement maxi de **3µm**
ROUX Guillaume	AUTRE	Tremblement de terre M7,7 Birmanie	28/mars/25	0h 17min	28/mars/25 08:02	28/mars/25 08:19	**Tremblement de terre M7,7 Birmanie** à 07h20. Suivie d'un réplique à 07h32. Amplitude max à 08h08 7,8µm sur le point source H de SMIS (C02-D1)

Example of the effect of the one that occurred in Burma (M7.6).



Horizontal position variation of 1 to 6 µm.

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