Experimental landscape

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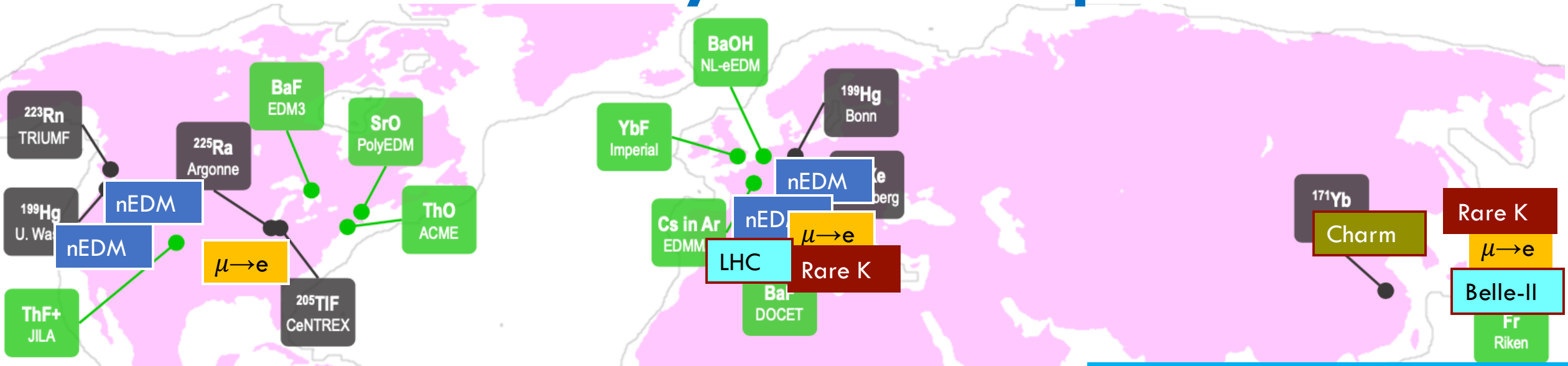
A diverse eco-system of experiments



Different sizes

Small size dedicated experiments (charged LFV, EDMs)

Medium size experiments focussing on a type of particle (K/π physics)

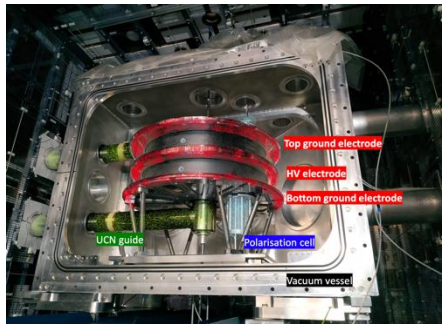
Large experiments 100% focussed (or not!) on Flavour physics

Different status

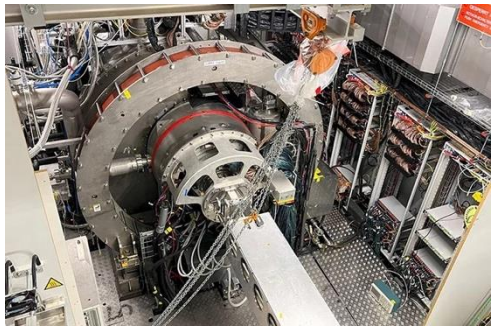
Running or approved

Proposed (not shown)

Channel(s)- specific experiments



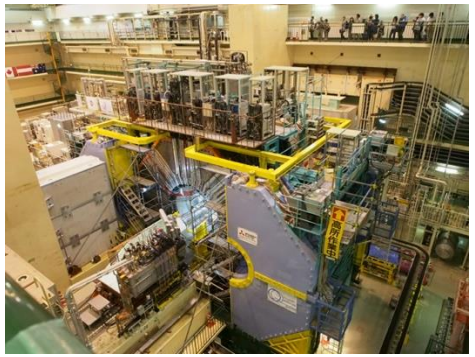
n2EDM



MEG-II

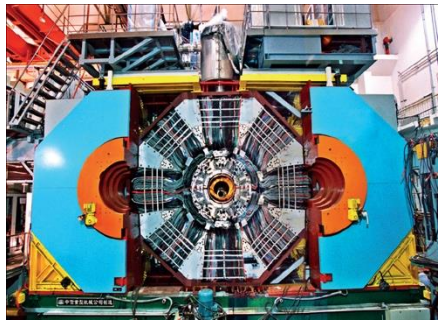
NA62

Use of large scale facilities : τ, D and B



Belle-II

LHC with LHCb-II but also ATLAS and CMS



inputs from BESIII

+ Future projects

Large scale facilities and experiments

Belle-II
e^+e^- @$\Upsilon(4S)$

LHCb
(+ ATLAS & CMS)

Running + upgrades

e^+e^- @ Z^0 pole
(+WW)

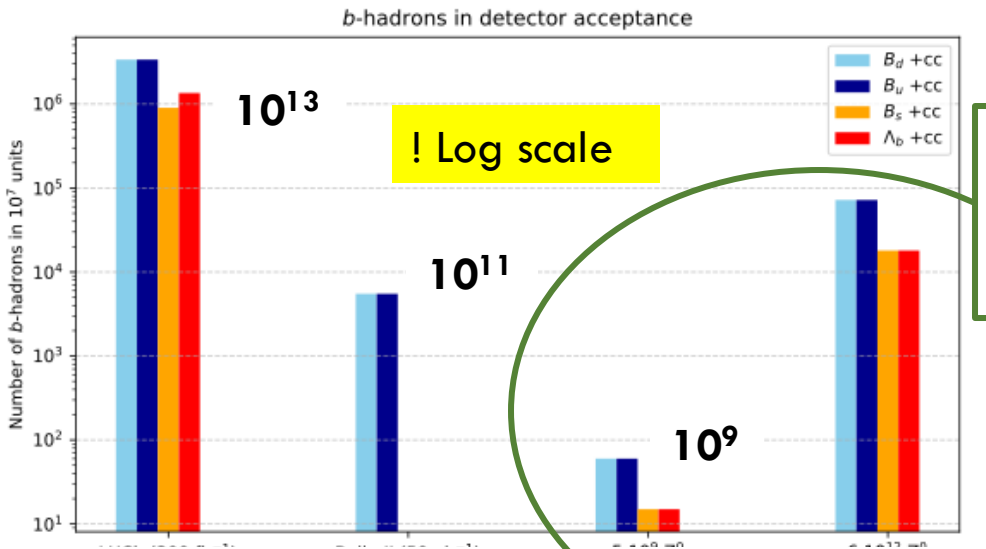
Proposals

Some extrapolations are 'wilder' than others due to larger dependence on the detector design which is not known

Once data is recorded, new analysis technics are usually found and foreseen sensitivities are reached … or even surpassed !

b-hadrons in detector acceptance :

- B_d +cc
- B_u +cc
- B_s +cc
- Λ_b +cc



The Z^0 pole 2050s
$BR(Z^0 \to b\bar{b}) \sim 15\%$

Indicative timeline

2030s

Belle-II
e^+e^- @$\Upsilon(4S)$

LHCb
(+ ATLAS & CMS)

LHCb 50 fb^{-1}
Belle-II 10 ab^{-1}

2040s

Belle-II
e^+e^- @$\Upsilon(4S)$

LHCb
(+ ATLAS & CMS)

LHCb-UII 300 fb^{-1}
Belle-II 50 ab^{-1}

2050s

e^+e^- @ Z^0 pole
(+WW)

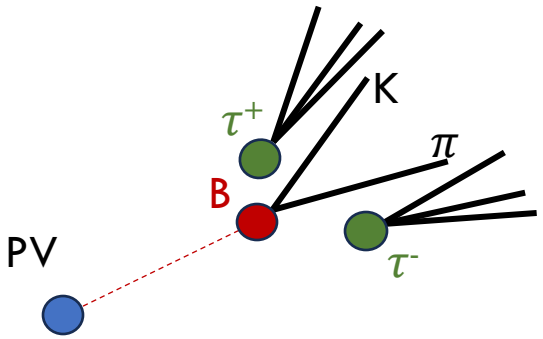
LCF : 5.10^9 Z^0
2 TeraZ 2.10^{12} Z^0
6 TeraZ 6.10^{12} Z^0

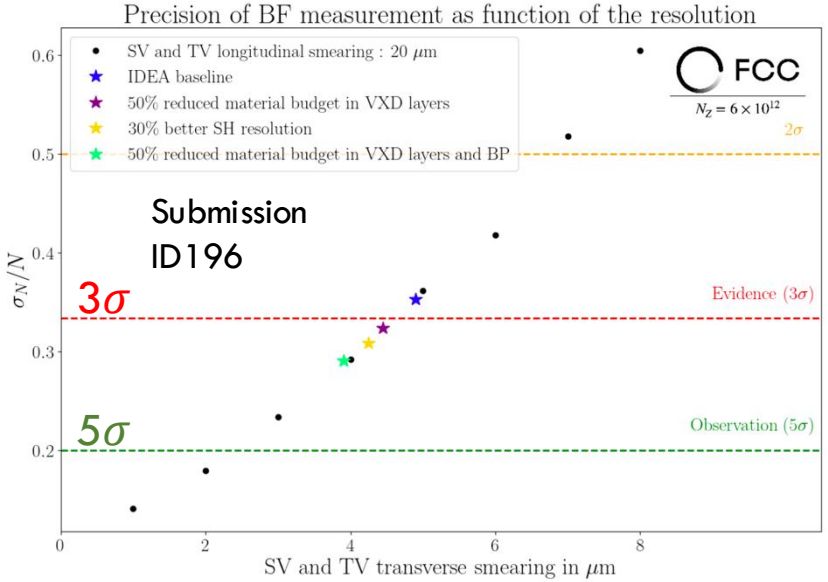
An excellent detector

To cover the full spectrum of Flavour Physics one needs :

- Excellent IP determination (Si vertex detectors) and multiple scattering as low as possible
- Excellent charged hadron identification (p/K/π separation) as well as e and μ
- Excellent tracking
- Ability to reconstruct low energy neutrals (γ, π^0)

$BR(B^0 \to K^{*0}\tau^+\tau^-)$ sensitivity crucially depend on the separation of the vertices. The lighter detector (and beam pipe) , the better !





Demonstrated by 'history' at previous facilities with wide program range :

- LEP : full flavour physics program mostly done by ALEPH and DELPHI (Si vertex detectors, charged hadrons ID)
- LHC : having a dedicated detector allows to cover a significantly wider spectrum of Flavour Physics

Next presentations

Rare decays of b and c quarks — *Marta Calvi (INFN-Milano Bicocca)*
Palazzo del Casinò, Sala Amici — 12:05 - 12:35

Tau physics — *Justine Serrano (IN2P3)*
Palazzo del Casinò, Sala Amici — 12:35 - 13:00

13:00

14:00

CPV & CKM elements from heavy quark decays — *Thibaud Humair (DESY)*
Palazzo del Casinò, Sala Amici — 14:00 - 14:30

Flavour physics with W & Z — *Patrick Koppenburg (Nikhef)*
Palazzo del Casinò, Sala Amici — 14:30 - 14:50

SM tests with Kaons & pions — *Radoslav Marchevski (EPFL)*
Palazzo del Casinò, Sala Amici — 14:50 - 15:05

15:00

EMDs and LFV in light families — *Guillaume Pignol (LPSC - IN2P3)*
Palazzo del Casinò, Sala Amici — 15:05 - 15:30

Large scale facilities

Large scale facilities

Channel(s)- specific experiments