

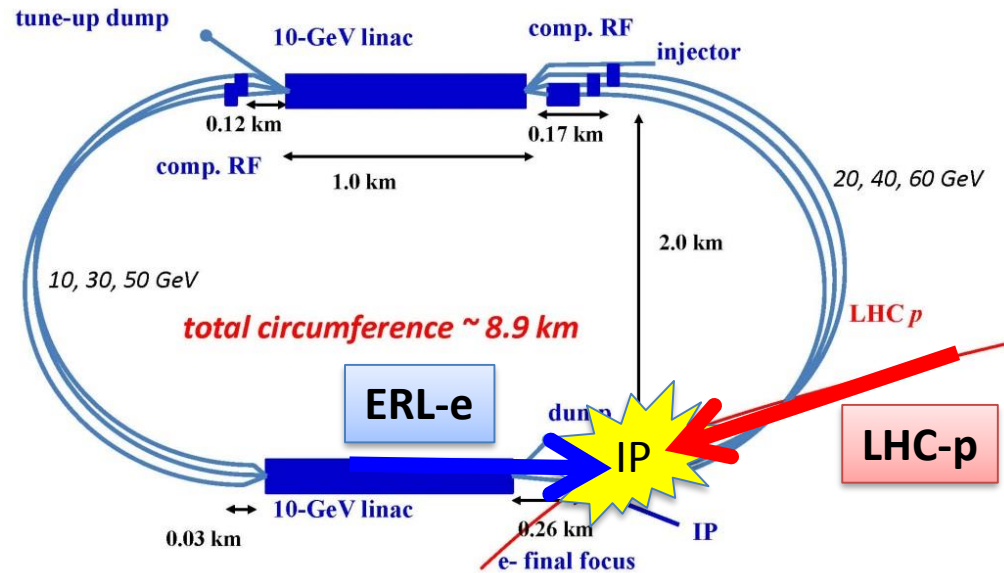
PERLE for Physics at the LHeC

Uta Klein
on behalf of
the LHeC/FCC-eh Study Group



- Design constraint: power consumption < 100 MW : $E_e = 60 \text{ GeV}$
using energy recovery: 'green' technology
- high electron polarisation of 80-90%

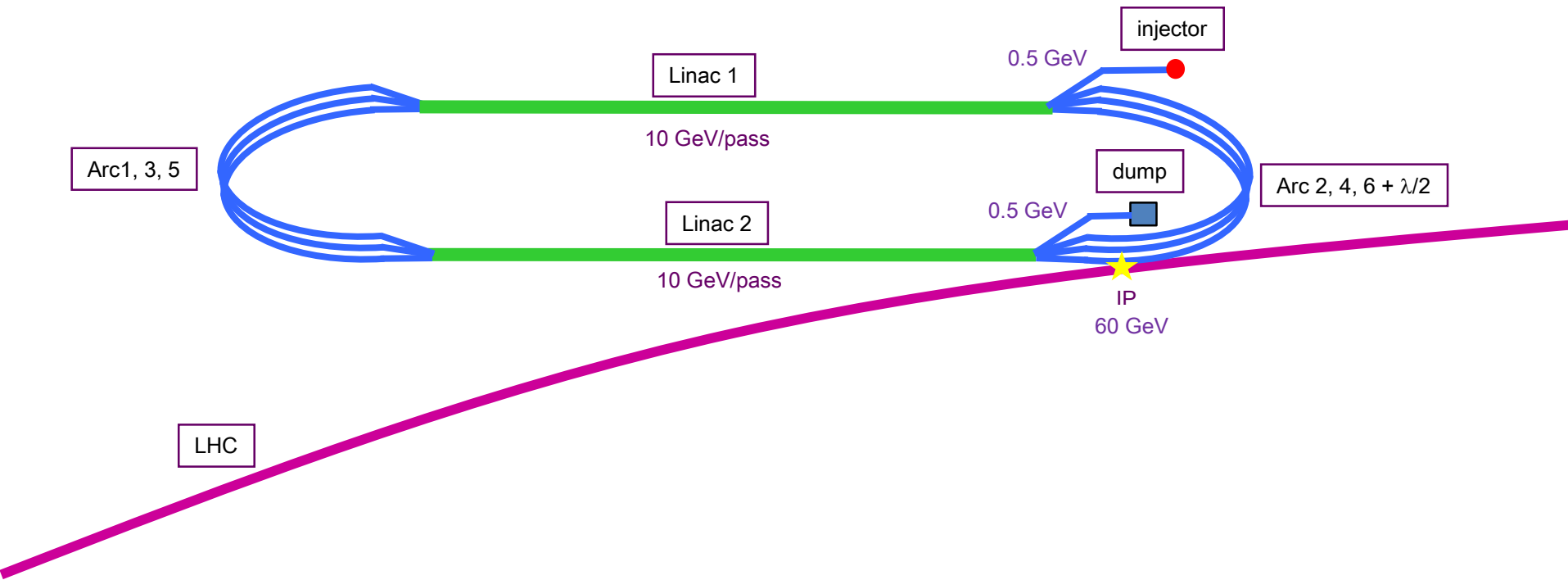
Installation decoupled from LHC !
Concurrent ep and pp operation !



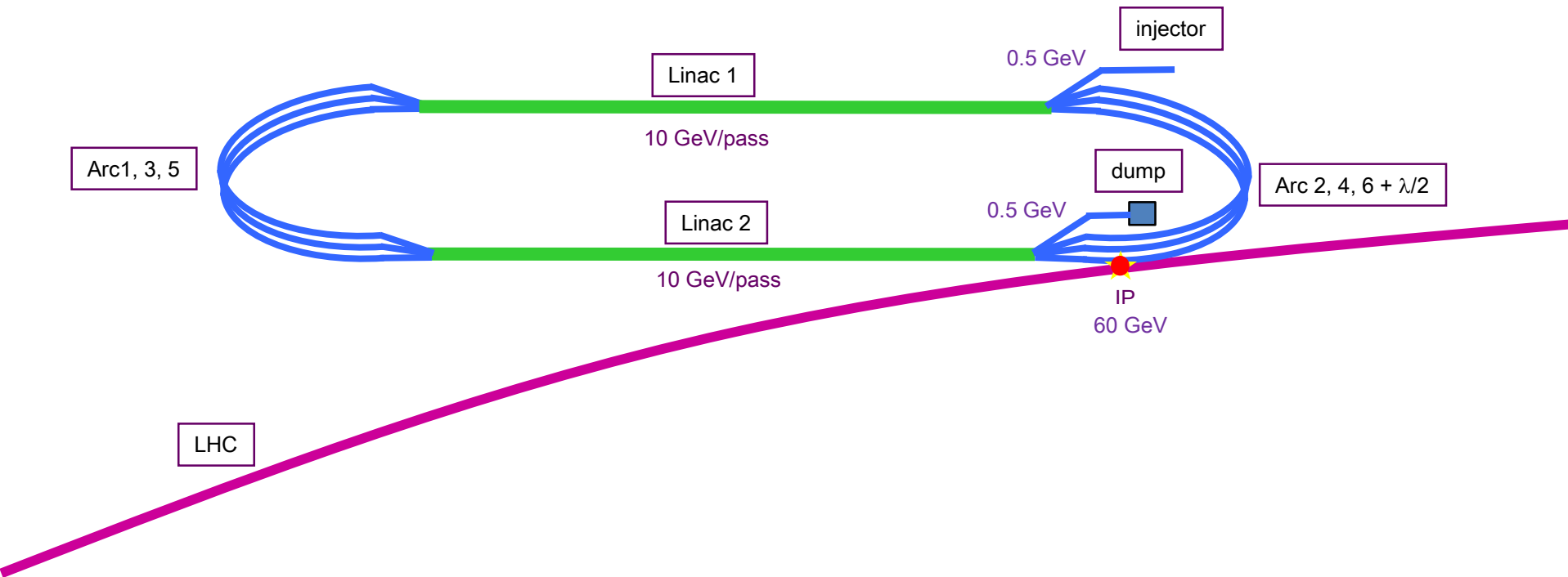
- ep Lumi $10^{34} \text{ cm s}^{-2} \text{ s}^{-1} **$
- 100 fb^{-1} per year
- $L = 1000 \text{ fb}^{-1}$ total collected in 10 years
- eA luminosity estimates $\sim 10^{33} \text{ cm s}^{-2} \text{ s}^{-1} \text{ eA}$
** based on existing HL-LHC proposal

Detector Design
for HL+HE ep
Peter Kostka et al
at LHeC Workshop

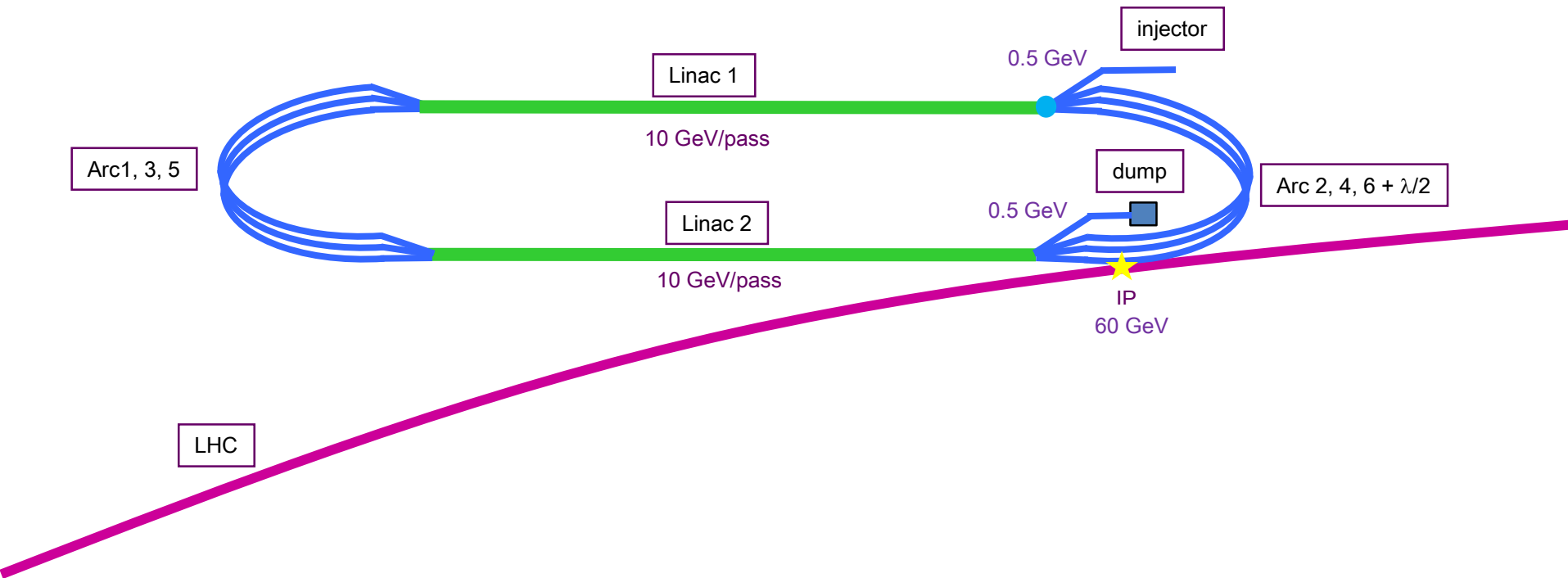
LHeC Recirculator with Energy Recovery



LHeC Recirculator with Energy Recovery

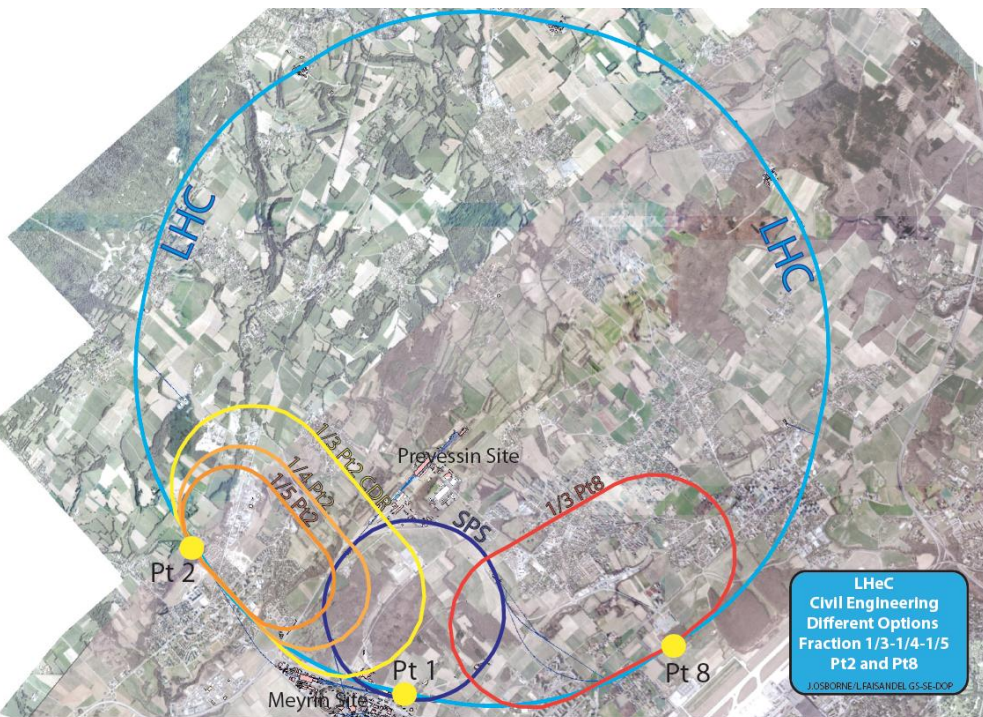


LHeC Recirculator with Energy Recovery



... towards EU strategy

- The LHC is fantastic – let's use it as best as we can!
- An ep@LHC collider – dubbed LHeC - could be build as an O(10%) cost upgrade to LHC: ep running concurrently with HL-LHC pp (from 2028-2038).
- LHeC would complement the pp and AA program by providing invaluable DIS data and high precision PDF, α_s and N³LO → turn HL-LHC into a powerful Higgs and search factory



- LHeC is surprisingly good at probing Higgs couplings - comparable to lepton colliders e.g. for Hbb.
- BSM sensitivity of ep shown by selected topics like sterile neutrinos, FCNC and Higgsino
- HL-LHC and LHeC are unique 'add-ons' → deserves further dedicated joint studies.
- **ERL demonstrator: PERLE !!**

From an empty hall to PERLE at Orsay



Visit of the future hall for PERLE, 24th of February, 2017

Welcome to David Douglas

Additional Sources & Thanks to

- Much more material can be found here: LHeC and FCC-eh Workshop, September 2017, CERN <https://indico.cern.ch/event/639067/>
- **The LHeC/FCC-eh study group, <http://cern.ch/lhec>.**
- “On the Relation of the LHeC and the LHC” [arXiv:1211.5102]
- 1st FCC Physics Workshop, 16.1.-20.1.2017, CERN <https://indico.cern.ch/event/550509/>
- HL-LHC and HE-LHC Workshop, 30.10.-1.11.2017, CERN <https://indico.cern.ch/event/647676/>