Electron Irradiation
in Bonn (ELSA accelerator)

Norbert Wermes

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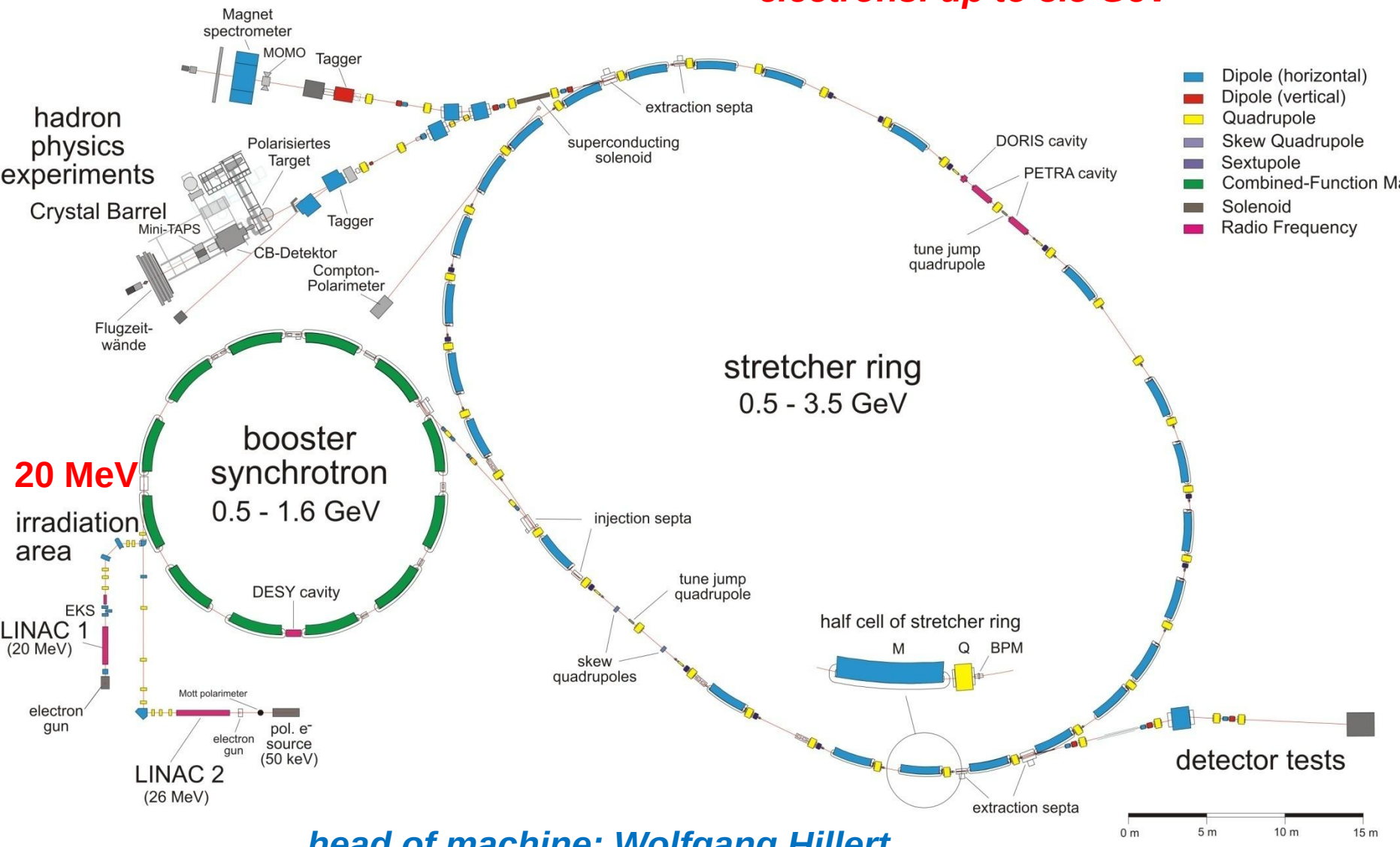
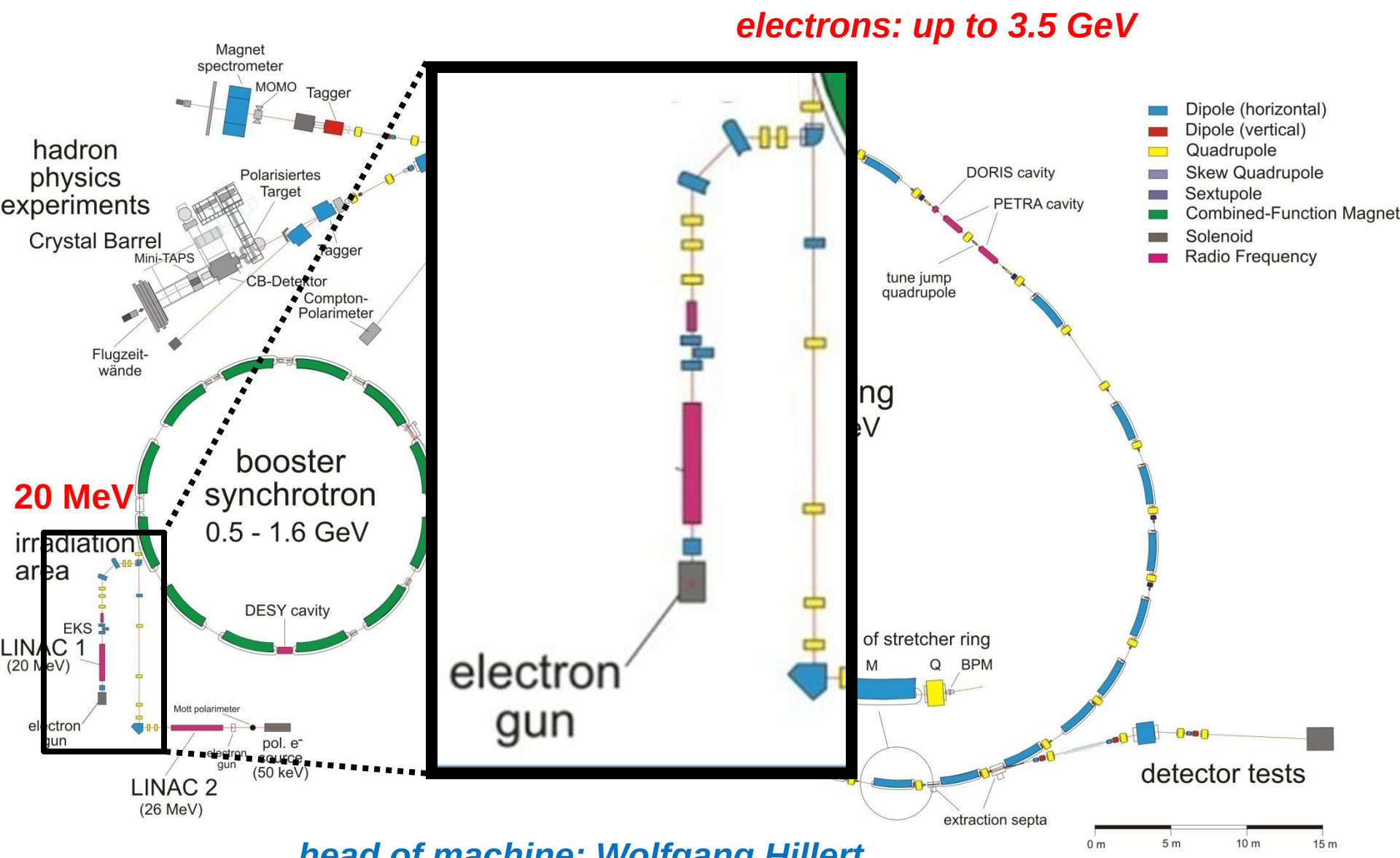
Electron Stretcher Accelerator (ELSA)

electrons: up to 3.5 GeV



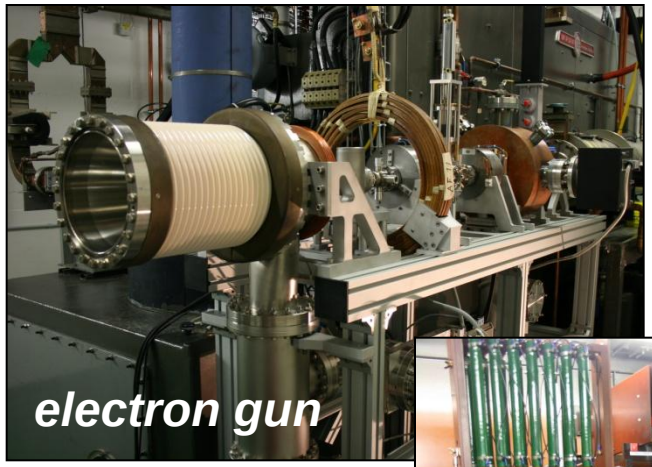
head of machine: Wolfgang Hillert

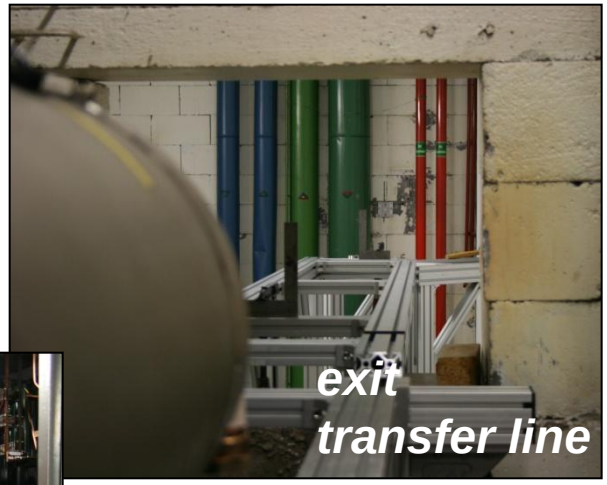
Electron Stretcher Accelerator (ELSA)

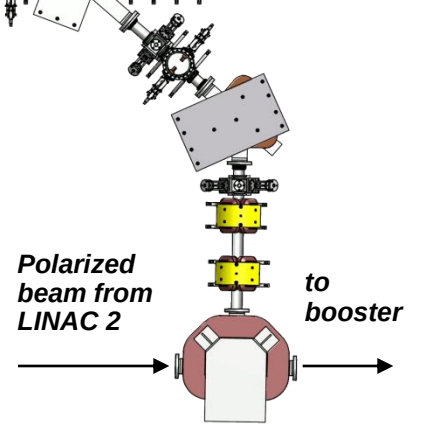


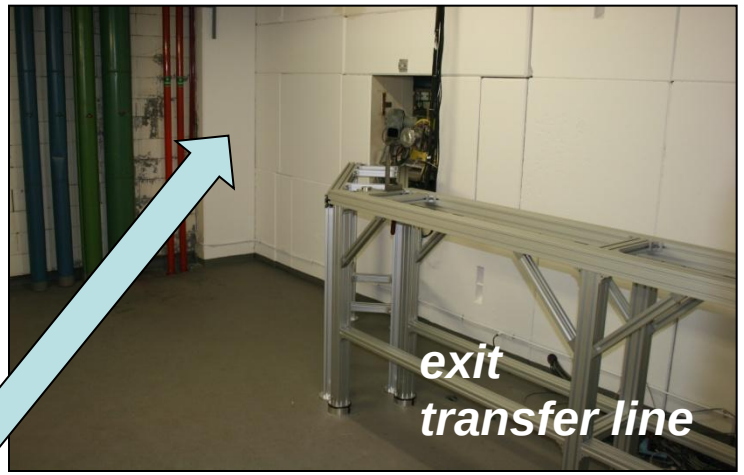
head of machine: Wolfgang Hillert

Injector *LINAC 1* *Transfer line* *Irradiation chamber*









position for irrdiation

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Linac 1

Operating Modes:

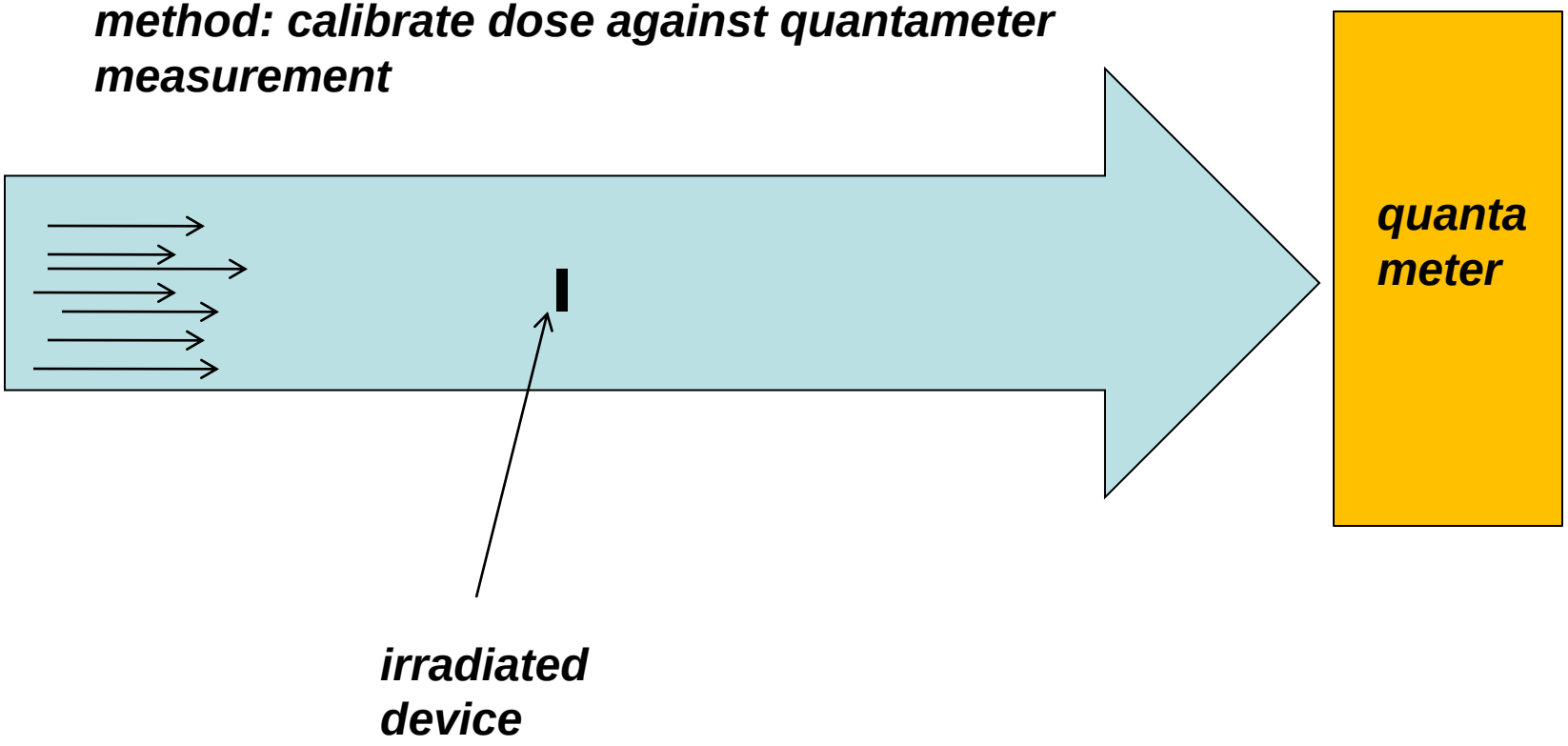
- Long pulse:
  - energy range $10\ \text{MeV} < E < 20\ \text{MeV}$
  - pulse length $\tau \geq 2\mu s$
  - max pulse charge $q \leq 0.5\ \mu C$
  - repetition rate $\nu \leq 50\ \text{Hz}$

  used for irradiation operation

- Short pulse
  - pulse length $\tau \geq 100\ \text{ps}$
  - pulse charge $q \leq 40\ \text{pC}$
  - repetition rate $\nu \leq 50\ \text{Hz}$

  used for low current high energy test beam (detector testing @ ELSA)

method: calibrate dose against quantameter measurement



measurement and DAQ → Julia Fourletova

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	max current		low current
beam current	**0.25**	A	**0.01**
pulse duration	**2.00E-06**	s	**3.00E-06**
pulse repetition rate	**50**	Hz	**50**
no. of electrons per pulse	**1.56E+18**		**6.25E+16**
density	**2.197**	g/cm^3	**2.197**
thickness SiO2 (drops out in eqn)	**1.00E+00**	cm	**1.00E+00**
eV/SiO2-thickness/electron	**3.63E+06**		**3.63E+06**
dep. energy/pulse/cm	**1.81E+00**	J/cm	**1.09E-01**
area detector	**0.25**	cm^2	**0.25**
beam spot area	**50**	cm^2	**50**
mass	**0.000549**	kg	**0.000549**
area ratio (det/beam)	**0.005**		**0.005**
dose per beam pulse	**1.65E+01**	Gy	**9.90E-01**
no. of pulses for 100 kGy/10 Mrad	**6061**		**101010**
time needed for 10 Mrad	**2.020**	min	**33.670**