

Ring Injection Parameter

Andreas Adelman

Lets use the “old” parameters for the moment

Compact storage ring to search for the muon electric dipole moment

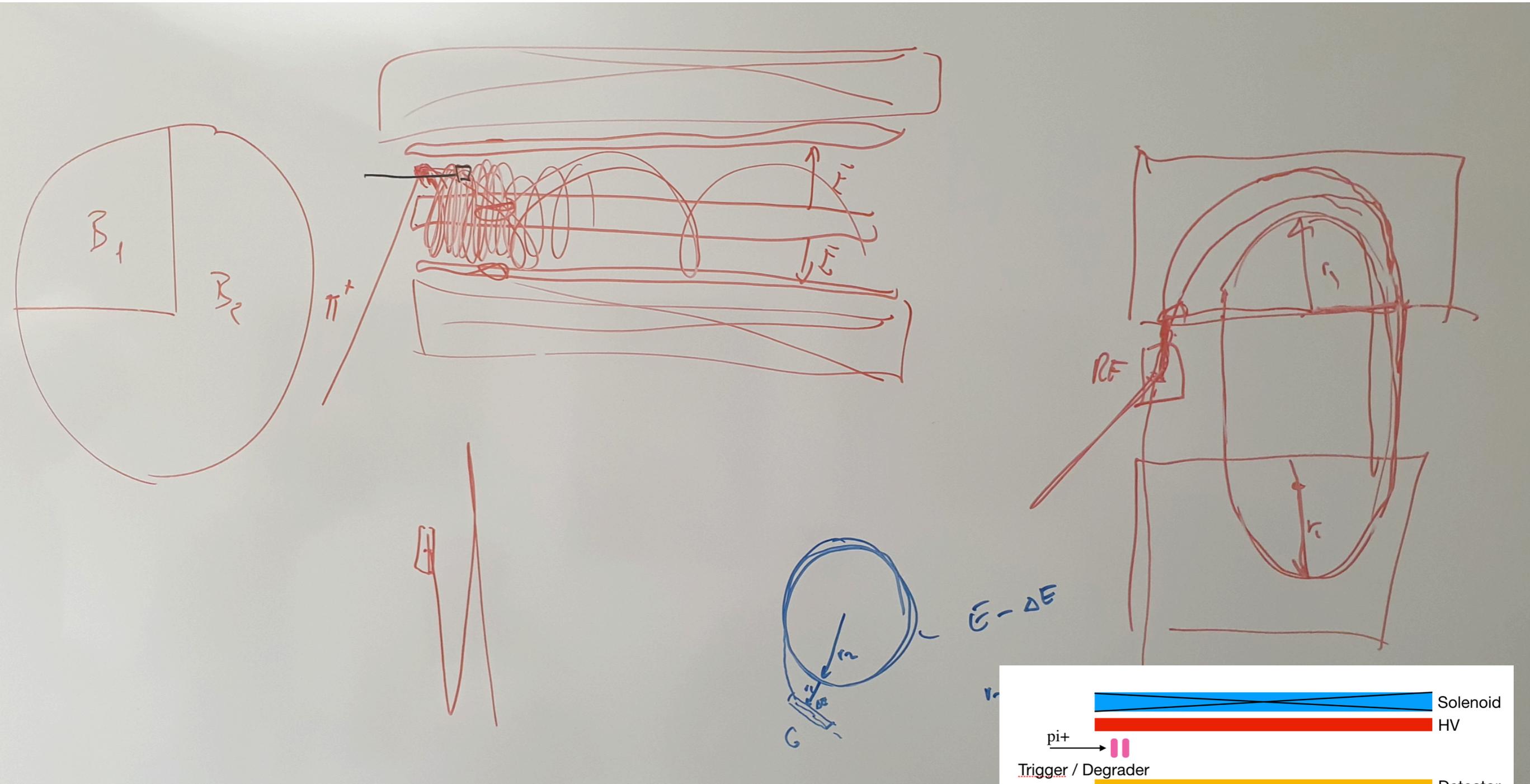
To cite this article: A Adelman *et al* 2010 *J. Phys. G: Nucl. Part. Phys.* **37** 085001

- * PSI μ E1 beamline
- * up to $2 \times 10^8 \text{ s}^{-1} \mu^+$
- * $p_\mu = 125 \text{ MeV}/c$ ($\beta = 0.77$, $\gamma = 1.57$) from backward decaying pions with $p_\pi = 220 \text{ MeV}/c$.
- * The muons arrive in bunches every 19.75 ns with a burst width slightly below 4 ns [23].
- * The muon polarisation is P 0.9; for the decay asymmetry we use $A = 0.3$
- * $B = 1 \text{ T}$ and $E = 0.64 \text{ MV m}^{-1}$
- * Ring radius of $R = 0.42 \text{ m}$.

The idea for the operation of the experiment at the μ E1 beamline is to use one muon at a time in the storage ring and observe its decay before the next muon is injected. This way, the high beam intensity is traded off for beam quality and muons suitable for the injection can be selected. Assuming an injection latency of $1 \mu\text{s}$ and an average observation time of $\gamma\tau_\mu = 3.4 \mu\text{s}$ results in more than 2×10^5 muon decays per second and allows for $N \sim 4 \times 10^{12}$ detected events per year

Discussions Group A

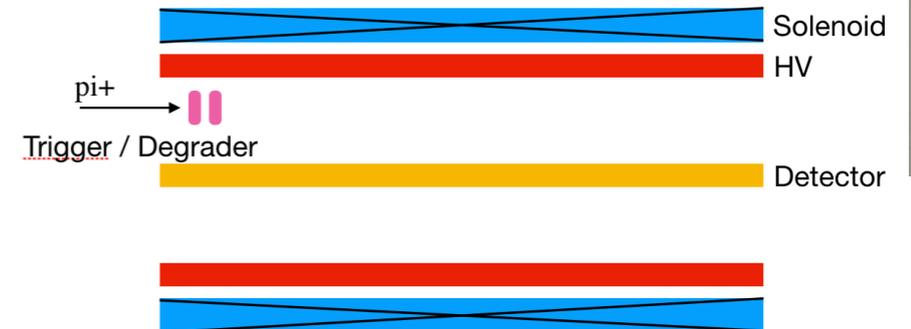
F. Meot, M. Giovannozzi, K. Kirch, T. Mibe, D. Reggiani A. Adelman + colleagues from WG C



Between crazy

&

super crazy



- Pertubator air coil technological question**
 - Pertubator breaks symmetry**
 - massless septum**

- Version A (28 MeV/c) feasible**

- Trigger: 50 MHz from Cyclotron (easy) or dedicated trigger**

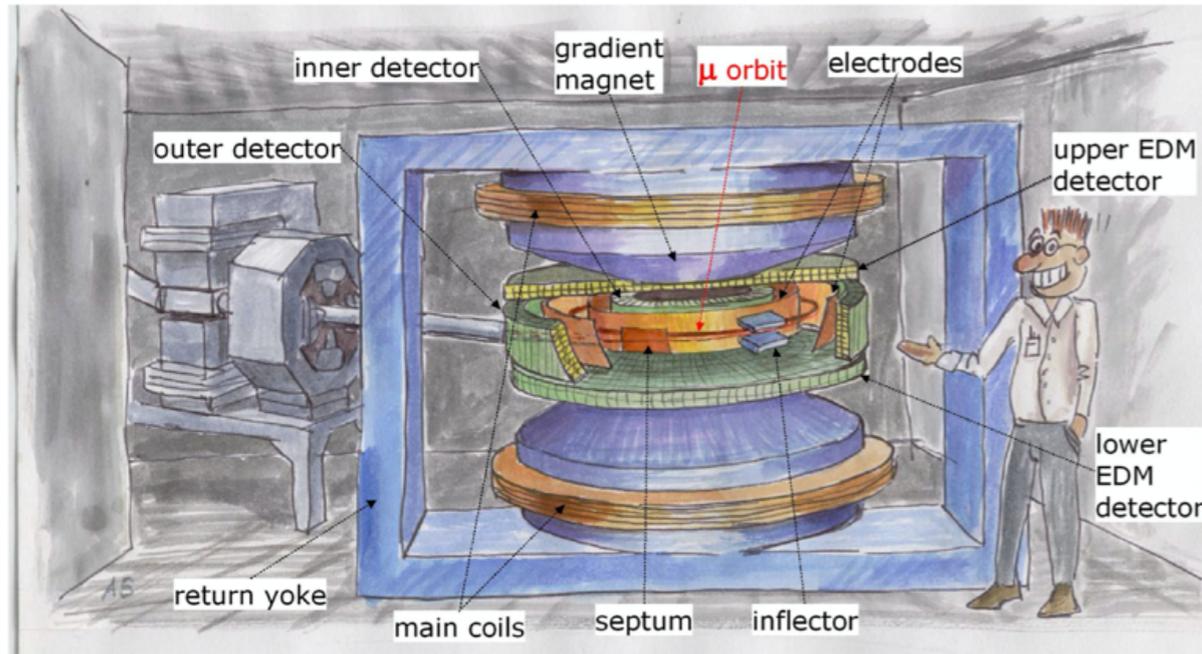
- Minimising number of turns at injection**

- Gas degrader**
 - **SF6**
 - **Gas curtain**

- New magnet configuration**
 - **Betatron yoke**
 - **Classical cyclotron configuration with straights**
 -

The best of 2 words?

PSI world

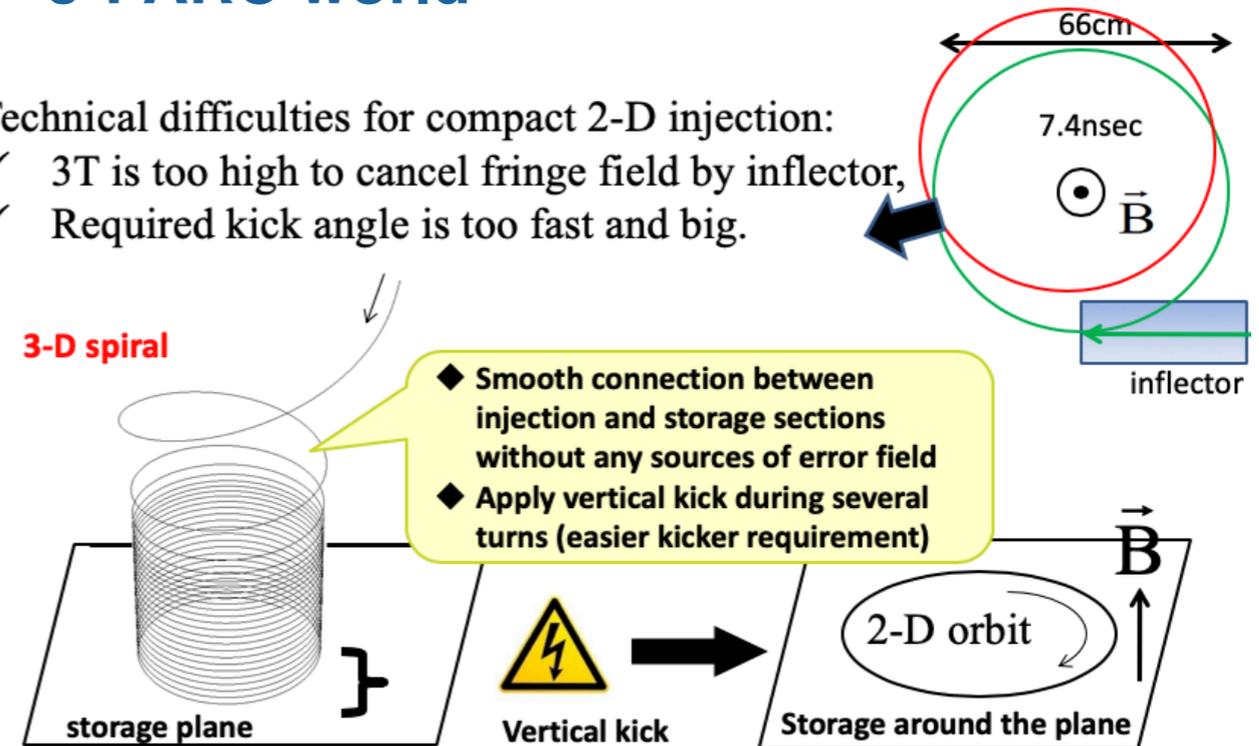


Artist's impression (A. Streun)

J-PARC world

Technical difficulties for compact 2-D injection:

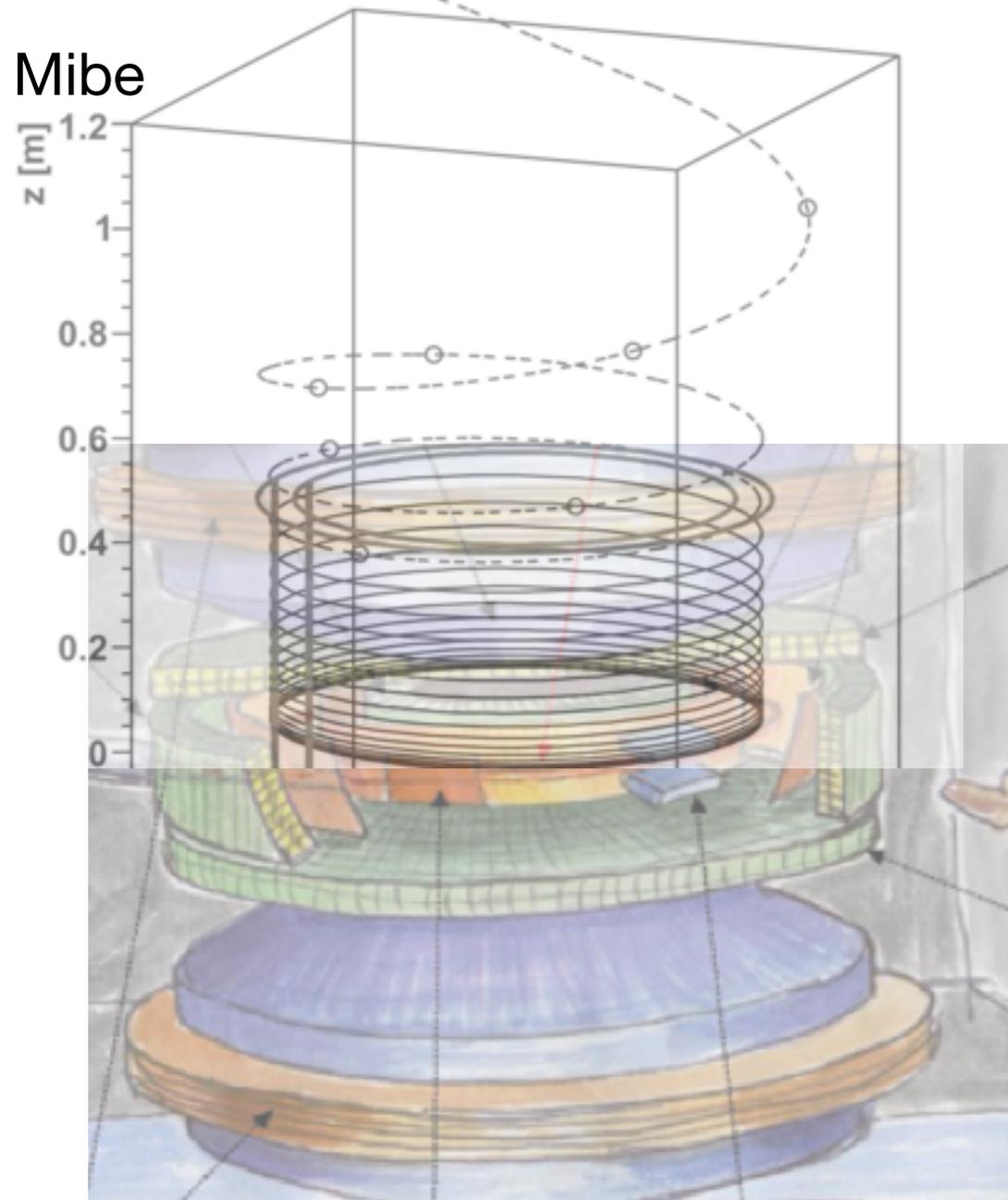
- ✓ 3T is too high to cancel fringe field by inflector,
- ✓ Required kick angle is too fast and big.



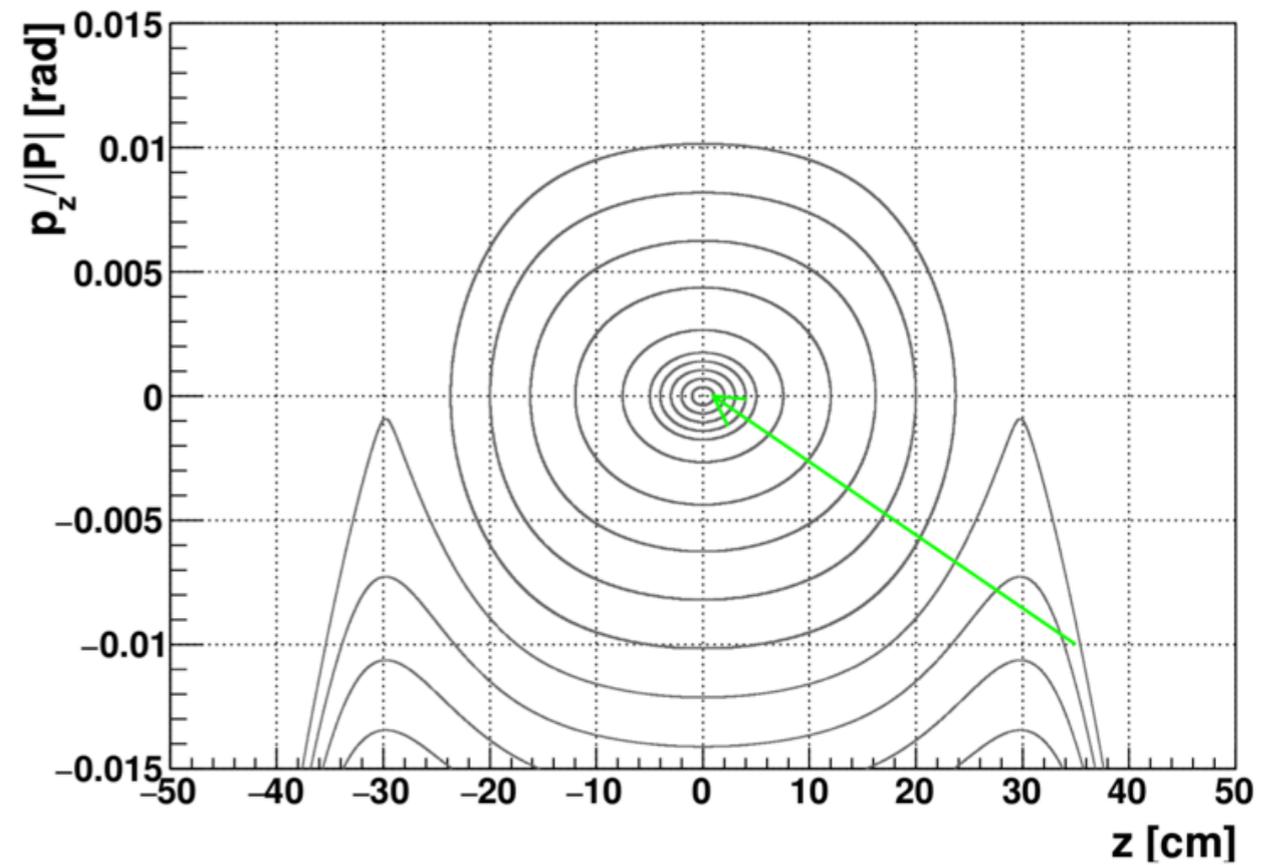
Slide by H. Inuma

Spiral injection à la J- PARC?

T. Mibe



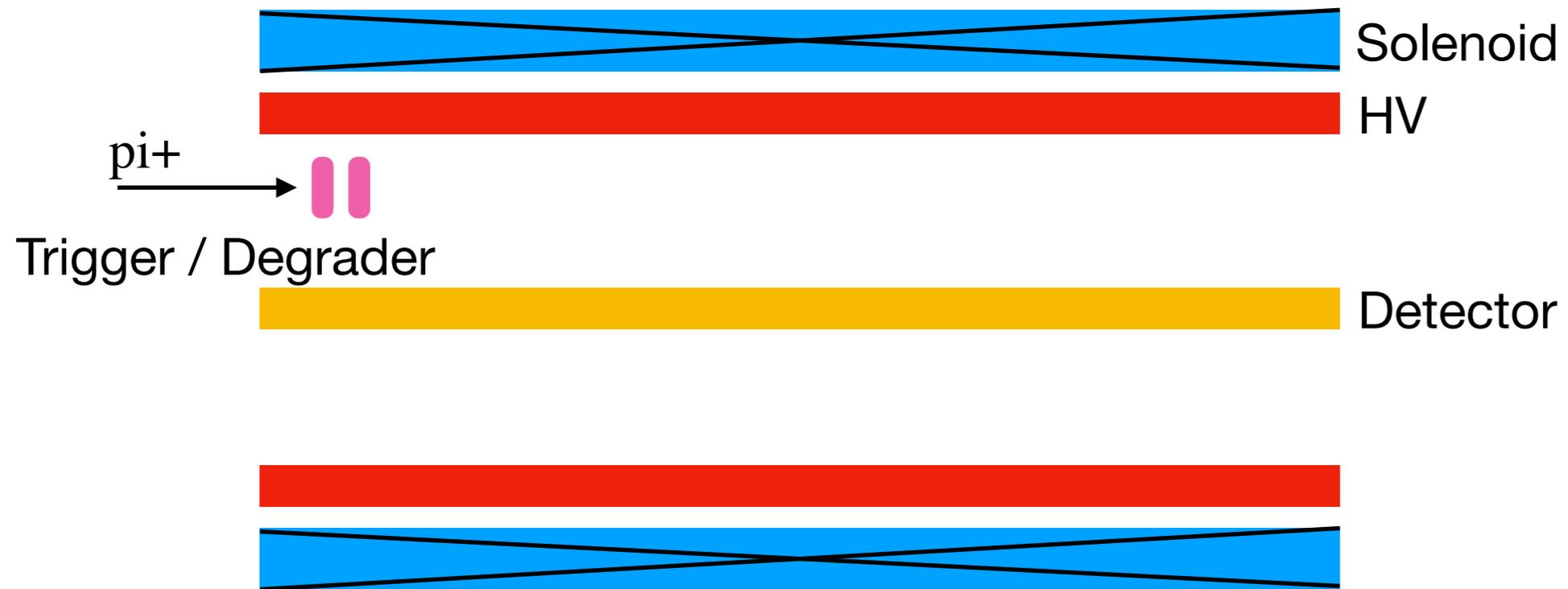
- no symmetry break due to inflector
- ~ 20 turns for injection
- easier to realise $\gamma = 1.57$



T. Mibe

Discussion w.r.t. Simulations

- ▶ **Ultimate goal full S2E (where is the start ?)**
- ▶ **UQ and sensitivity analysis**
- ▶ **Fix code base now: Geant, Zgoubi, MADX-PTC**
- ▶ **Put together a code/model interest group**



Concepts **Action Items**

- * Pertubator (study on: symmetry, pulsing)
- * Injection à la J-PARC

SC Magnet (fields, access reversibility)

- * used MRI magnets

- * High voltage
- * low weight, foils/wires

- * Simulations

- Phase space acceptance (1)
- Additional focussing

- Study magnets .3 ... 1.5 T
- Additional coils

- Study material budget

- Setup of a number of relevant input decks (1)

- USPAS

- Staged approach (1)

- Next steps, follow up workshop?

Used MRI magnets

FOR SALE

PHILIPS Panorama HFO 1.0T MRI Machine

PHILIPS Panorama HFO 1.0T MRI Machine



Price

160 000 USD

Seller

TECHNOMED

☆☆☆☆☆ (Reviews: 0)

Contact name

Alireza Tavakoli

CONTACT SELLER

TECHNOMED
Medical Parts & Equipment

Synergies

- * Codes: BMAD-PTC, Zgoubi**
- * MRI experience (ANL, J-PARC)**
- * High voltage (MSc Univ. Aachen)**
- * Magnet for low field options**