eHD update – August 31/2015

A.M. Sandorfi

- factors driving the schedule:

  - manpower

  - 10 MeV beam transport through the IBC ⇔ a schedule pivot point

- schedule update

- budgets

- summary

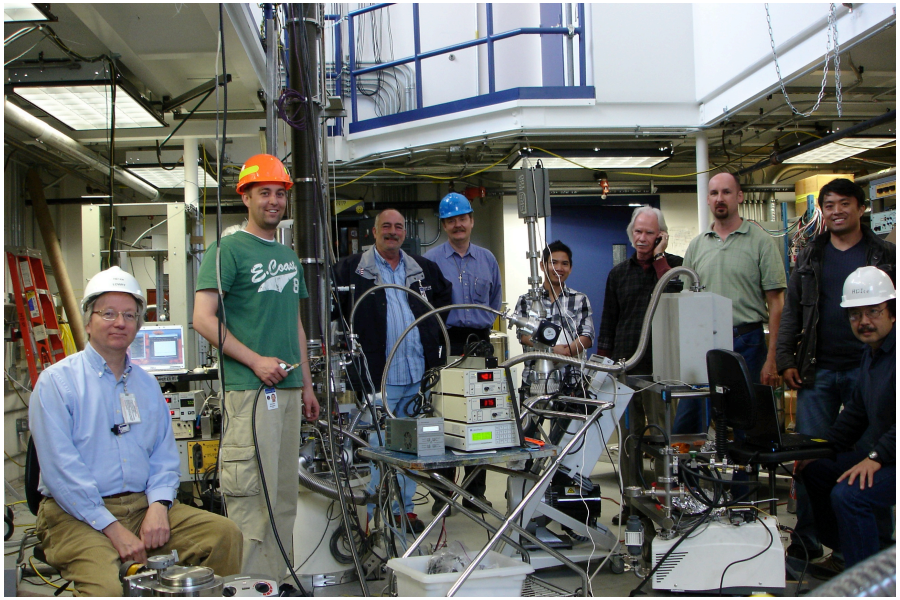
HDice manpower

g14 era

C. Bass
A. Deur
G. Dezern
C. Hanretty
D. Ho
T. Kageya
V. Laine
M. Lowry
T. O'Connell
P. Peng
A. Sandorfi
X. Wei

A. D'Angelo
P. Collins
M. Khandaker
C. Nepali, N. Walford

g14 crew prior to target transfer



➔

present

G. Dezern
C. Hanretty

T. Kageya

M. Lowry

A. Sandorfi
X. Wei

A. D'Angelo

Beam transport through the IBC - update

design goals:

- beam should uniformly illuminate HD (to spread out ionization and heat), and should be confined to HD

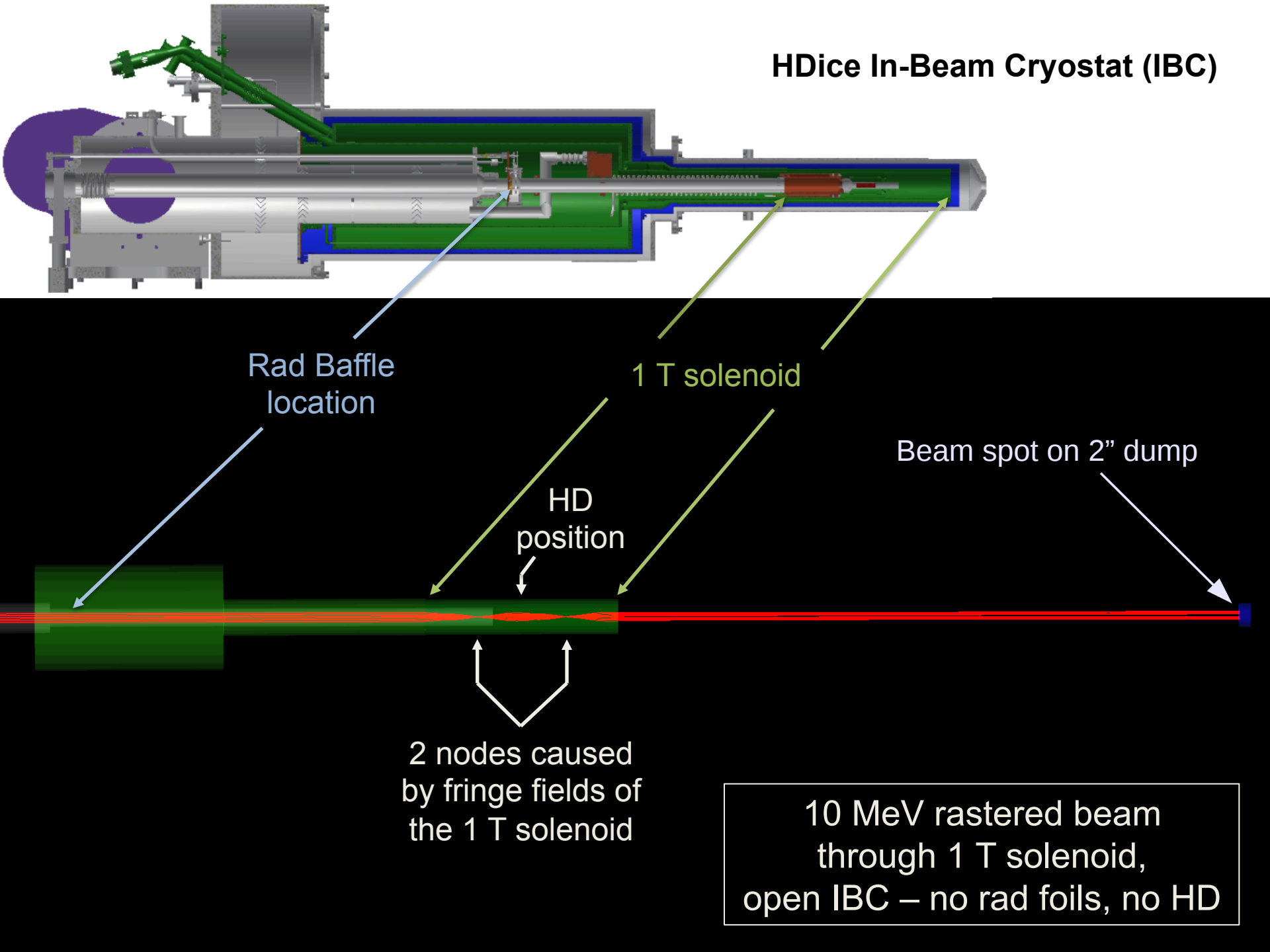
tools:

- **G4beamline**, a front-end GUI for GEANT-4 with particular focus on beam transport

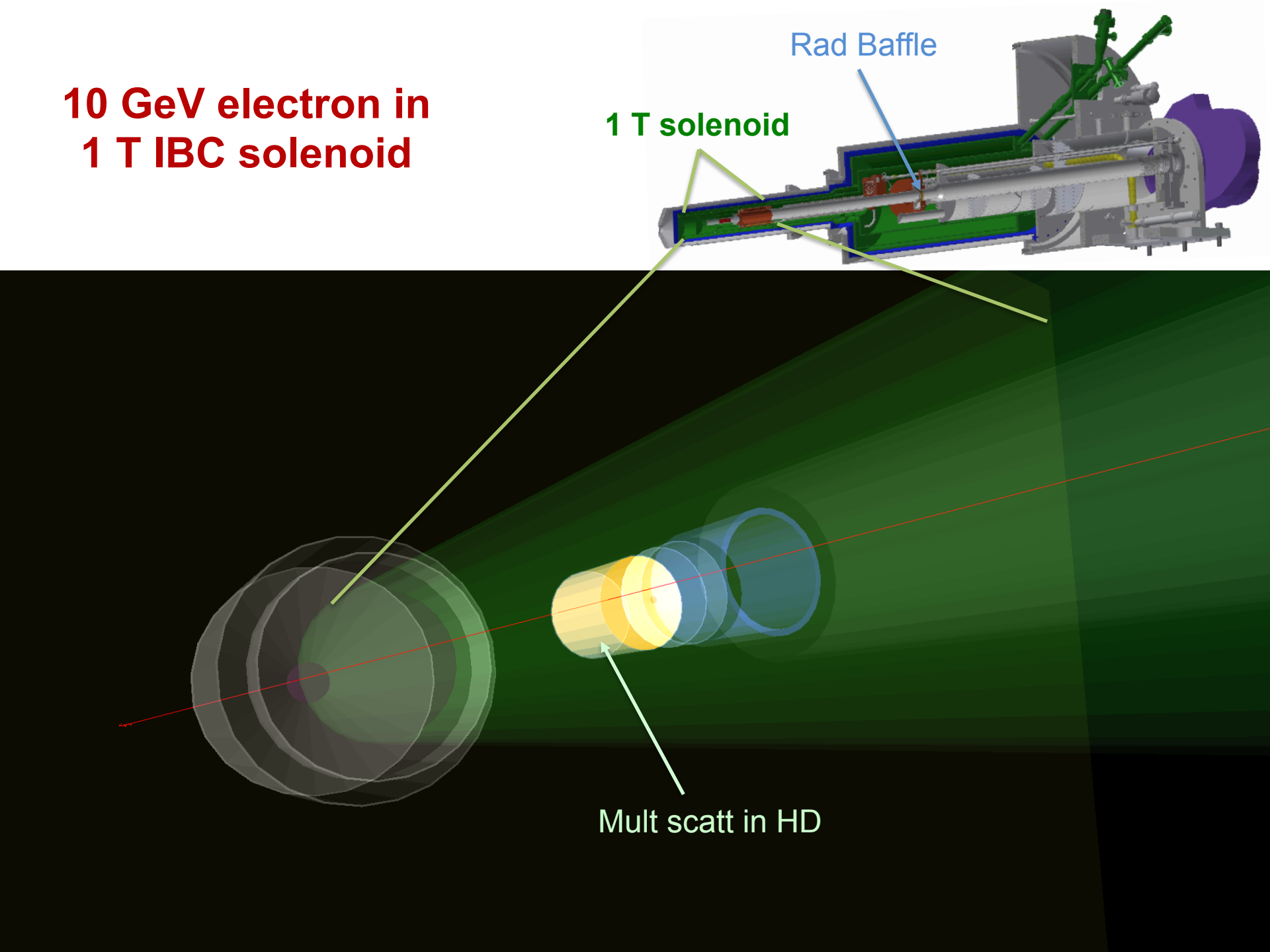
lead effort:

- Charles Hanretty of HDice

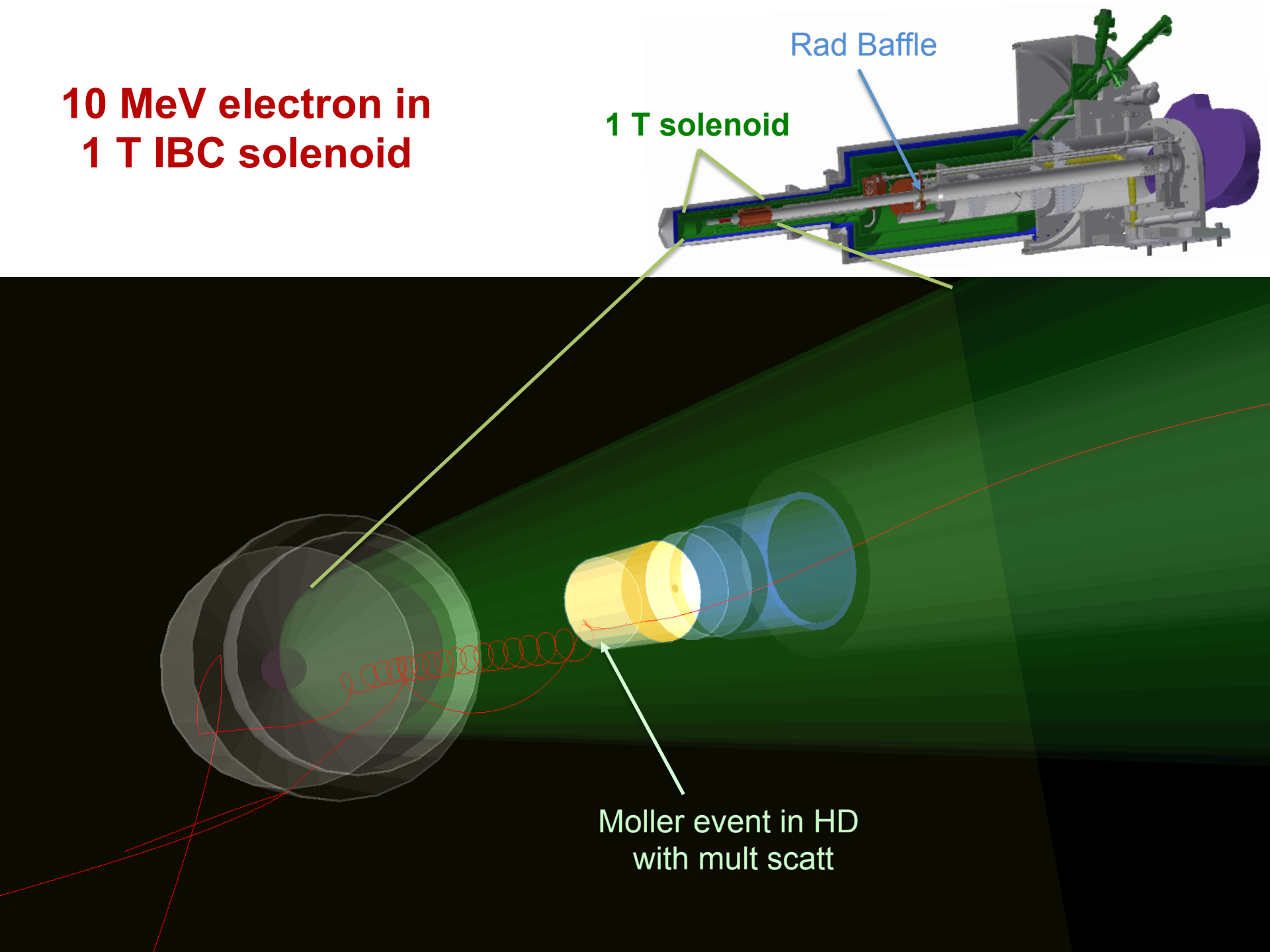
HDice In-Beam Cryostat (IBC)



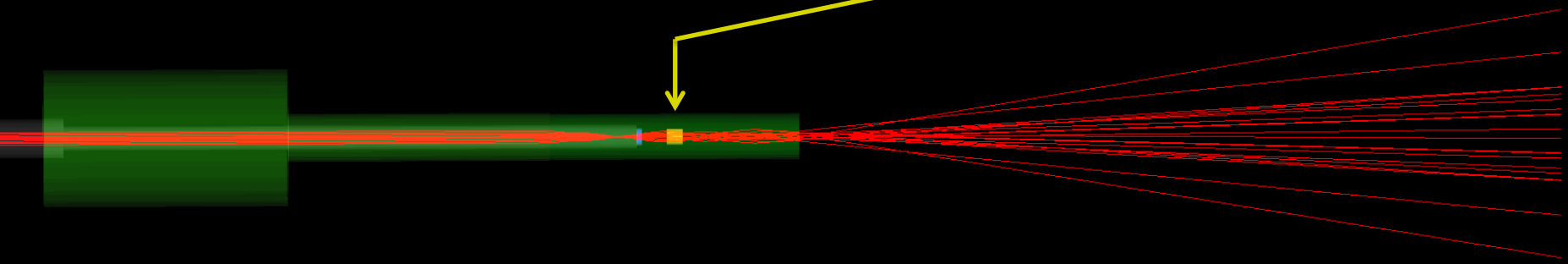
10 GeV electron in 1 T IBC solenoid

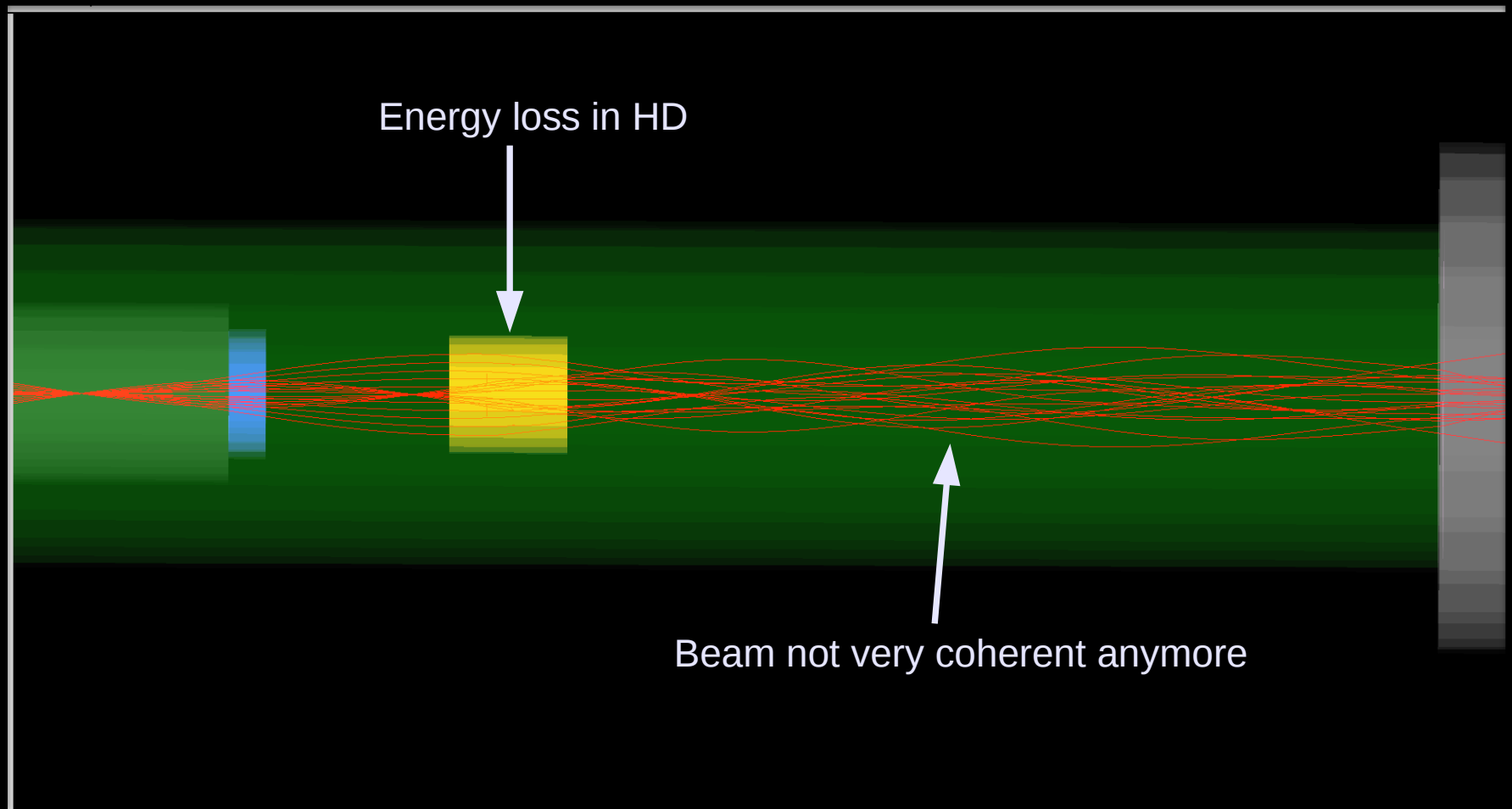


10 MeV electron in 1 T IBC solenoid

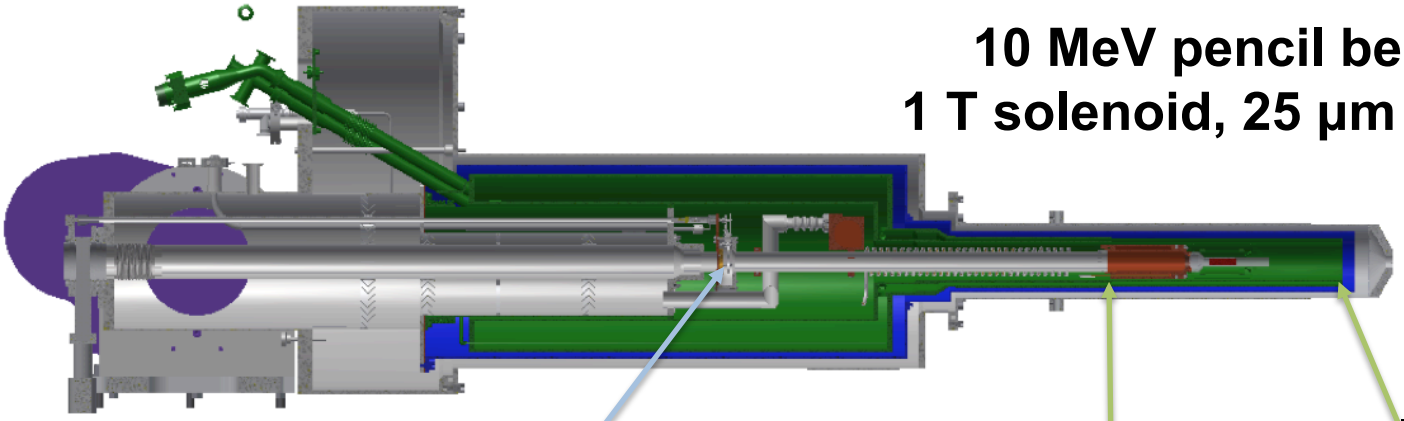


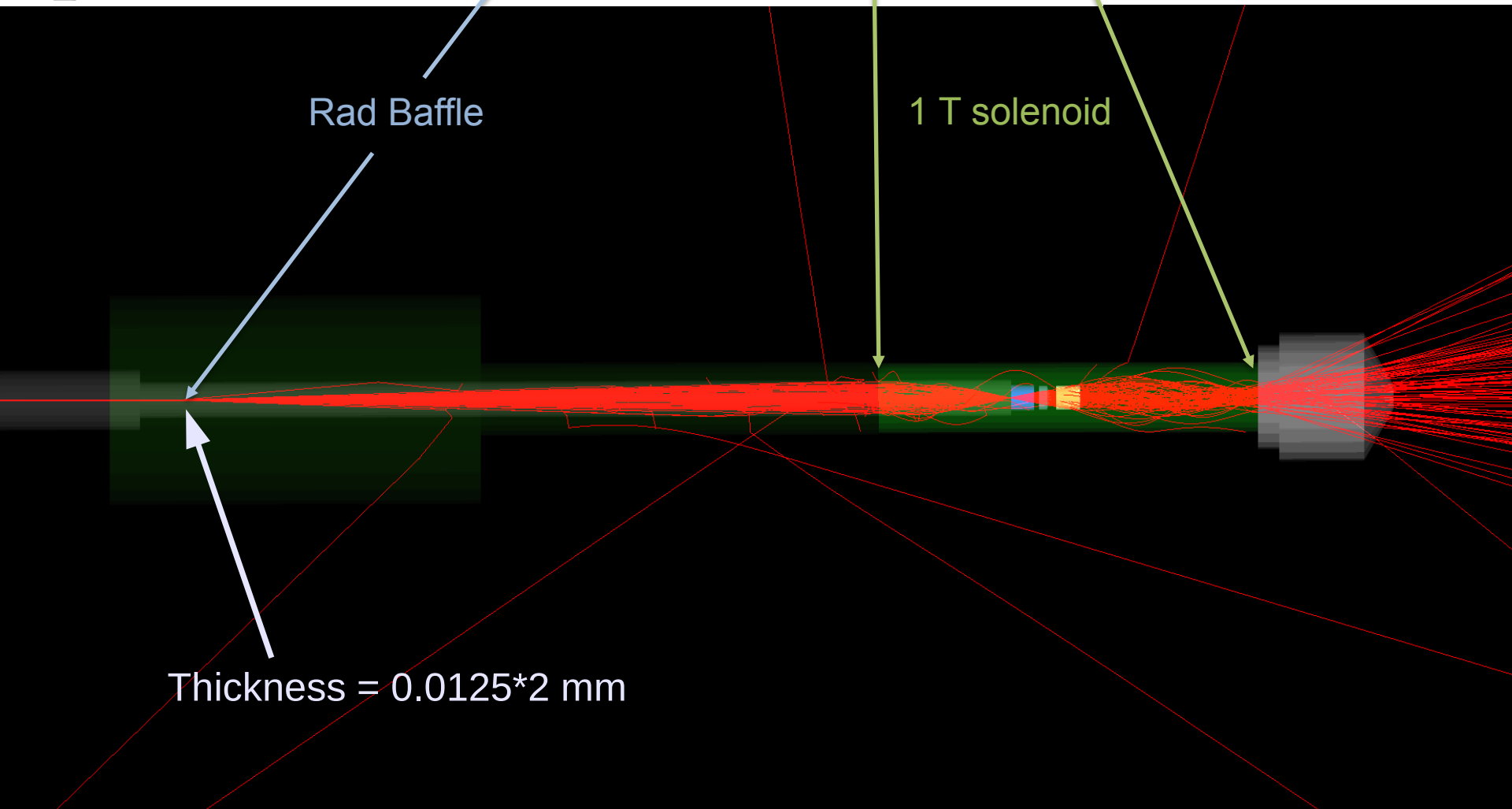
10 MeV through 1 T solenoid with **HD**, but no rad foils



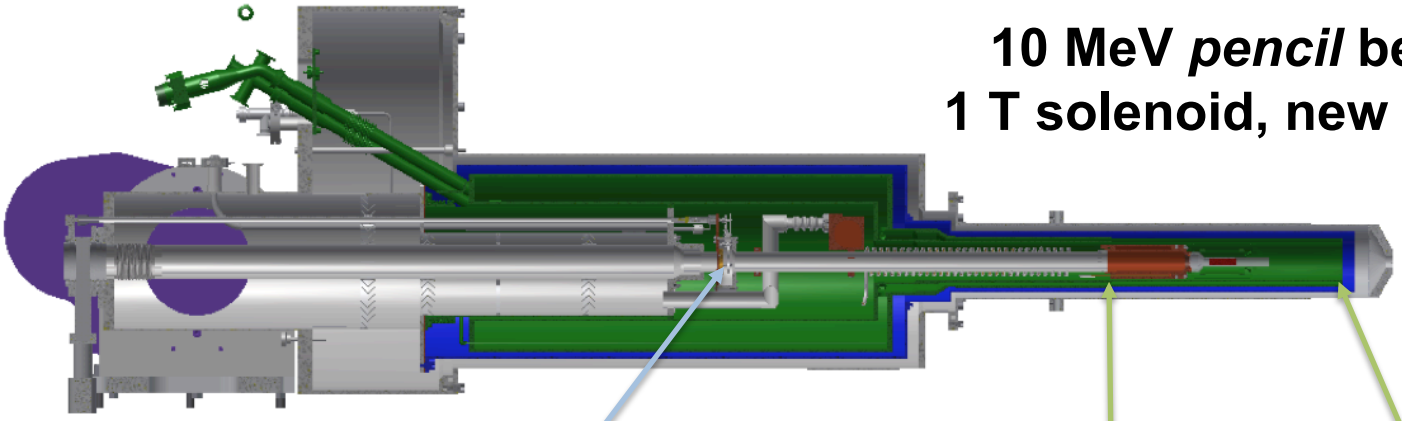


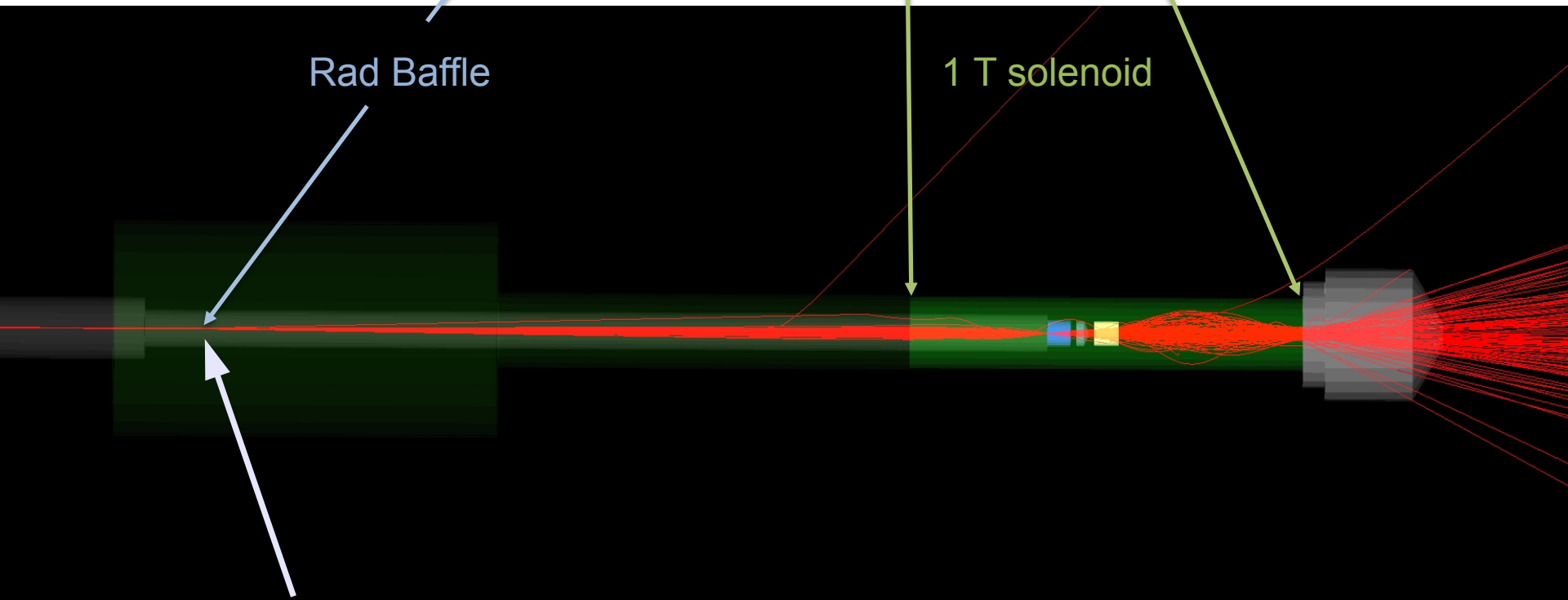
10 MeV pencil beam (σ = 150 μm),
1 T solenoid, 25 μm rad baffle (g14)**, HD**





10 MeV *pencil* beam (σ = 150 μm),
1 T solenoid, new 3 μm rad baffle, HD





Thickness = 0.0015*2 mm

(x 10 thinner than present g14 foils)

Beam transport through the IBC - update

design goals:

- beam should uniformly illuminate HD (to spread out damage and heat), and should be confined to HD

status:

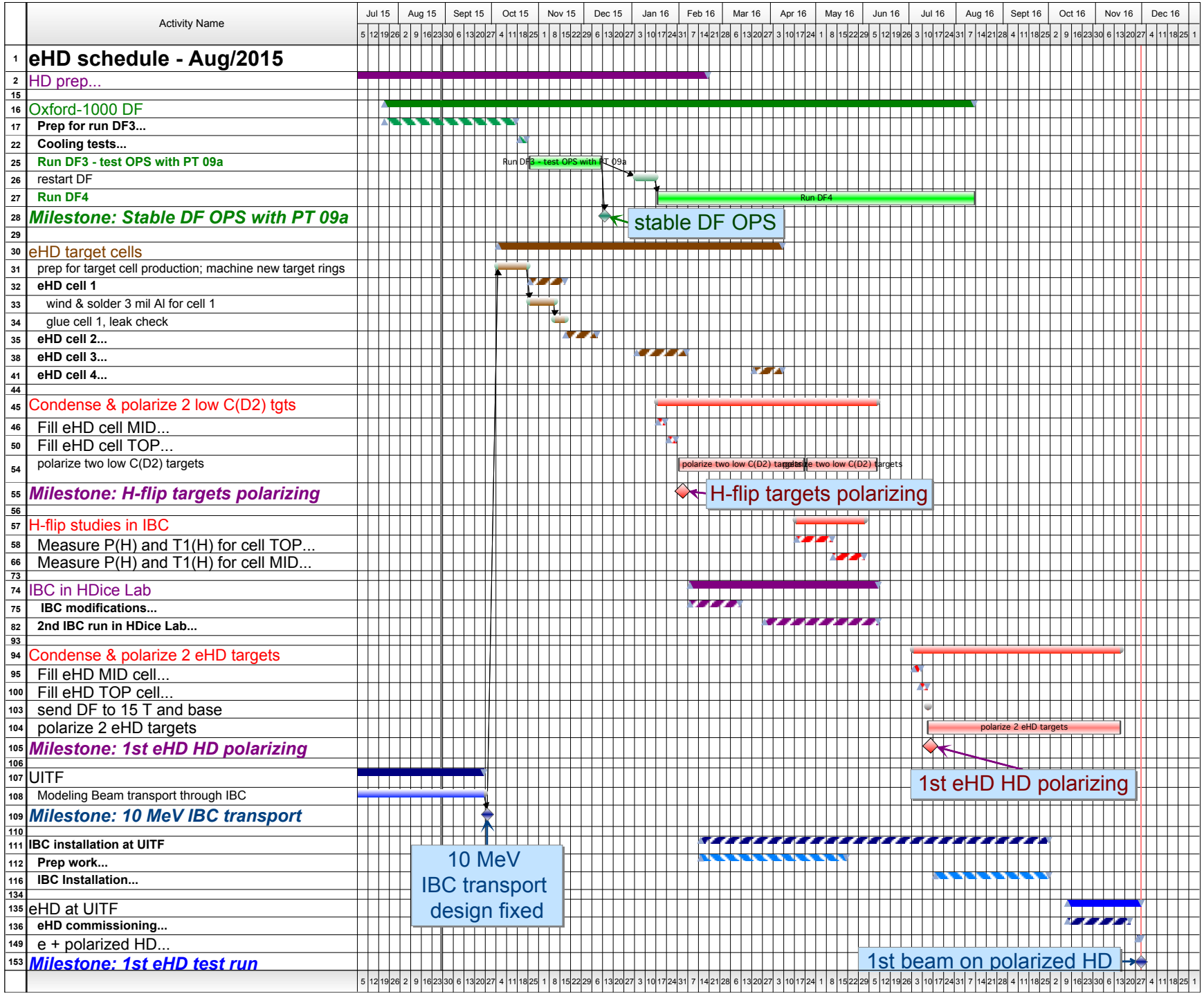
- new 2 x 1 ½ μm radiation baffle will leave a pencil beam ~ confined within HD target, but does not yet fill the target volume
- yet thinner foils may be possible

next steps:

- develop a combination of raster pattern and beam energy that will fill the HD volume

- investigate option of incorporating a collimator immediately in front of the target to clean up halos

⇔ hope to conclude by ~ end of September


Activity Name
Jul 15
Aug 15
Sept 15
Oct 15
Nov 15
Dec 15
Jan 16
Feb 16
Mar 16
Apr 16
May 16
Jun 16
Jul 16
Aug 16
Sept 16
Oct 16
Nov 16
Dec 16
1 eHD schedule - Aug/2015
2 HD prep...
16 Oxford-1000 DF
17 Prep for run DF3...
22 Cooling tests...
25 Run DF3 - test OPS with PT 09a
26 restart DF
27 Run DF4
28 Milestone: Stable DF OPS with PT 09a
30 eHD target cells
31 prep for target cell production; machine new target rings
32 eHD cell 1
33 wind & solder 3 mil Al for cell 1
34 glue cell 1, leak check
35 eHD cell 2...
38 eHD cell 3...
41 eHD cell 4...
45 Condense & polarize 2 low C(D2) tgts
46 Fill eHD cell MID...
50 Fill eHD cell TOP...
54 polarize two low C(D2) targets
55 Milestone: H-flip targets polarizing
57 H-flip studies in IBC
58 Measure P(H) and T1(H) for cell TOP...
66 Measure P(H) and T1(H) for cell MID...
74 IBC in HDice Lab
75 IBC modifications...
82 2nd IBC run in HDice Lab...
94 Condense & polarize 2 eHD targets
95 Fill eHD MID cell...
100 Fill eHD TOP cell...
103 send DF to 15 T and base
104 polarize 2 eHD targets
105 Milestone: 1st eHD HD polarizing
107 UITF
108 Modeling Beam transport through IBC
109 Milestone: 10 MeV IBC transport
111 IBC installation at UITF
112 Prep work...
116 IBC Installation...
135 eHD at UITF
136 eHD commissioning...
149 e + polarized HD...
153 Milestone: 1st eHD test run
Run DF3 - test OPS with PT 09a
Run DF4
stable DF OPS
polarize two low C(D2) targets
H-flip targets polarizing
polarize 2 eHD targets
1st eHD HD polarizing
10 MeV IBC transport design fixed
1st beam on polarized HD

Budgets

FY'2015

- requested = **$220 K**

- allocated Oct 1'14 = $108 K
- adjusted Feb 12'15 ➔ **$ 22 K**

FY'2016

- requested = **$430 K**

- allocated July'15 = **$108 K**

- Liquid Helium (125 K)
- equip. maint., HD processing (137 K)
- NMR development (16 K)
- UITF installation (96 K)
- Grad student support (56 K)

⇔ working with Volker to see what can be absorbed within Hall B OPS; bottom line is still unclear

e+HD summary

Expectation:

- 1st beam on polarized HD by Thanksgiving/2016

Potential issues that could affect the e+HD schedule:

- satisfactory conclusion from IBC beam transport studies
- manpower (more would have a very positive impact)
- budget