DPA and Gas Production from Protons on W and Be

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DPA and Gas Production in Tungsten

- Ran the Mu2e target in MARS15 using the following parameters:
  - 8 GeV protons on Tungsten target
  - Gaussian distribution with 1mm X and Y sigma
  - 6mm diameter, 160mm length target
  - 3 bins/sigma radially, 1cm bins axially

Results

- Peak DPA:
  - 1.4e-18 DPA/p
- Gas production:
  - H: 60 appm/DPA
  - He: 20 appm/DPA

Converted to yearly..

- 1.9e20 p/yr estimated
- Peak DPA:
  - 260 DPA/yr
- Gas production:
  - H: 16000 appm/yr
  - He: 5300 appm/yr

DPA and Gas Production in Beryllium

- Ran an arbitrary case in MARS15:
  - Varying energy protons on Beryllium target
    - 2 MeV, 250 MeV, 120 GeV
  - Gaussian distribution with 0.3mm X and Y sigma
  - 2.1mm diameter (7 sigma), 10mm length target
  - 1 bin/sigma radially, 1cm bins axially

Results

		DPA (/p)	H (appm/DPA)	He (appm/DPA)
120 GeV		3.66E-21	1030	2885
250 MeV		6.29E-21	720	3400
2 MeV	First 20um	4E-19	10-30	0
	Bragg Peak	7.5E-18		

- Values are shown averaged over a volume of:
  - 1 sigma diameter
  - 1cm depth for 120 GeV and 250 MeV, depth shown for 2 MeV

Results scaled to LBNE style beam

- 700kW case:
  - 1.3mm beam sigmas
  - 3.7E13 protons/sec
  - 100% uptime

	DPA (/yr)	H (appm/yr)	He (appm/yr)
120 GeV	0.23	235	659
250 MeV	0.39	283	1330

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