Flux measurement on cryostat

- **Sim configurations**
  - Rock, no shotcrete no concrete
  - Rock with shotcrete and concrete
  - Concrete solo
  - Shotcrete solo
- **Predictions**
  - Rock, no shot/concrete: 8.32E-06 neutrons / s / cm^2; very close to 7.6E-06 neutrons / s / cm^2 measured in mine
  - Sum of separate sources: 3.09E-06 neutrons / s / cm^2, reduction as expected from adding the rocky aggregate layers

Volume	Chain	N Produced	N passing	Flux	Total	
Rock	U Early	1003248	2905	3.36E-07		
Rock	U Late	1003601	2791	1.11E-06		
Rock	Thorium	1005092	2903	4.98E-07	1.94E-06	
Concrete	U Early	19587	3287	1.59E-07		
Concrete	U Late	19683	3308	1.14E-07		
Concrete	Thorium	19284	3268	2.39E-08	2.97E-07	
Shotcrete	U Early	53305	9287	4.52E-07		
Shotcrete	U Late	52696	9242	3.26E-07		
Shotcrete	Thorium	53273	9442	6.83E-08	8.46E-07	3.09E-06
Rock no crete	U Early	1003862	11791	1.36E-06		
Rock no crete	U Late	1004730	12230	4.86E-06		
Rock no crete	Thorium	1004950	12240	2.1E-06	8.32E-06	

Flux measurement on LAr

- **Sim configurations**
  - Rock, no shotcrete no concrete
  - Rock with shotcrete and concrete
  - Concrete solo
  - Shotcrete solo

- **Predictions**
  - Rock, no shot/concrete: 1.31E-07 neutrons / s / cm^2
  - Sum of separate sources: 3.31E-08 neutrons / s / cm^2

Volume	Chain	N Produced	N passing	Flux	Total	
Rock	U Early	1003248	15	2.37E-09		
Rock	U Late	1003601	14	7.62E-09		
Rock	Thorium	1005092	19	4.46E-09	1.45E-08	
Concrete	U Early	19587	29	1.92E-09		
Concrete	U Late	19683	26	1.23E-09		
Concrete	Thorium	19284	40	4E-10	3.55E-09	
Shotcrete	U Early	53305	100	6.67E-09		
Shotcrete	U Late	52696	145	7E-09		
Shotcrete	Thorium	53273	148	1.47E-09	1.51E-08	3.31E-08
Rock no crete	U Early	1003862	115	1.82E-08		
Rock no crete	U Late	1004730	146	7.94E-08		
Rock no crete	Thorium	1004950	144	3.38E-08	1.31E-07	

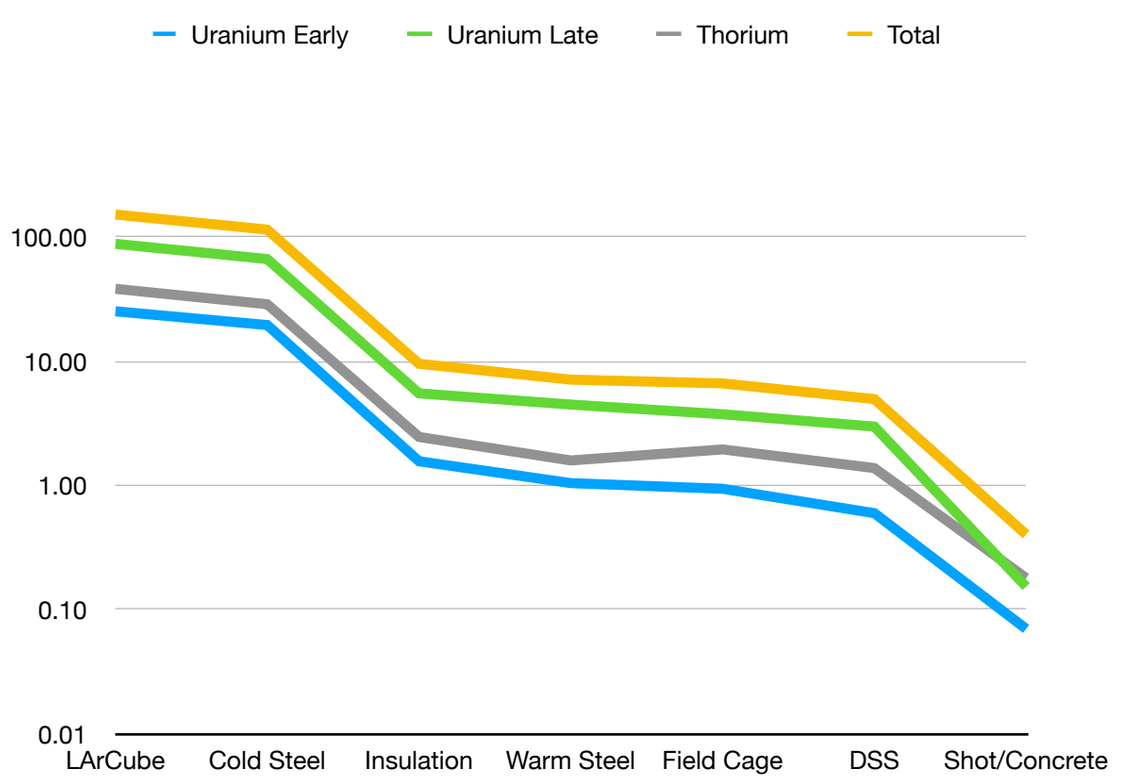
Capture rate with new TGraphs

- **Capture rate with fixed input spectra**
  - Bug was causing neutrons with higher energy than true
  - Fixed spectra have knock on effects to capture rate
  - Lower energy neutrons as they go through layer by layer
  - Total capture rate from Rock not ~0.40 Hz
  - Capture rate reflects the difference in fluxes on the cryostat and LAr (O(100) drop)

- **Notable changes**
  - Drastic drop in rate from inclusion of insulation layers
  - Much higher than the predicted 66% drop

Table 2

Rock Layer Thickness [cm]	Uranium Early	Uranium Late	Thorium	Total	% drop wrt previous	% drop wrt initial
LArCube	25.26	88.25	38.31	151.83		
Cold Steel	19.57	66.52	28.79	114.88	24.33	24.33
Insulation	1.57	5.52	2.46	9.54	91.69	93.71
Warm Steel	1.04	4.48	1.59	7.12	25.42	95.31
Field Cage	0.94	3.74	1.95	6.64	6.77	95.63
DSS	0.60	2.98	1.38	4.96	25.27	96.73
Shot/Concrete	0.07	0.15	0.18	0.40	91.87	99.73



Total capture rate from Rocky Layers

- **Including the shot/concrete**
  - Concrete, as expected, only some what contributes to the overall capture rate
  - Shotcrete has a large contribution to the capture rate
  - Total capture rate from external rocky sources ~1.2 Hz

Table 2

Material	Capture rate	Uncertainty
Rock	4.03E-01	7.42E-02
Concrete	4.01E-02	9.32E-03
Shotcrete	7.19E-01	3.95E-02
TOTAL	1.16E+00	8.46E-02