Detector and Conventional Facilities Materials Assay Results: Filter, APA & Others

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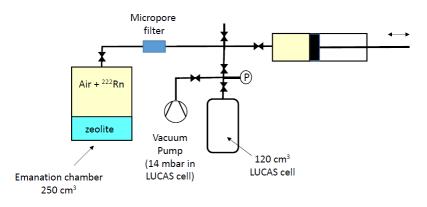


**DUNE Backgrounds Mitigation Strategies Workshop** 

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# Internal Backgrounds: Radon Emanation into LAr from Filter Materials

### Jose Busto (CPPM Marseille)



	Zeolite	Cu Getter
Mass	71.5 g (20Bq/kg)	76.5g (2Bq/kg)
Ra in emanation chamber	1.44 Bq	0.153 Bq
Rn in Lucas cell	40.1 Bq/m3	20 Bq/m3
Rn in emanation chamber	0.01 Bq/m3	0.0052 Bq/m3
Ration Rn in air chamber	0.7 %	3.4 %

=> 0.55 mHz/kg alpha-ray activity in our LAr corresponding to a Rn-222 level of only 0.14 mBq/kg

This would already meet our Recommendation!

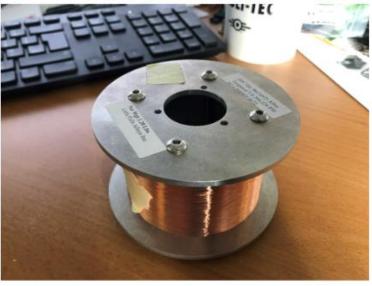
=> 0.1 mBq/kg goal of Rn-222 in LAr seems feasible (especially with further cold suppression)!

Plans for unique cold emanation measurement into Ar

 $\Rightarrow$  Asks for extensive emanation assays of "2<sup>nd</sup> order" components (e.g. large cables @ Sheffield?)



## DUNE APA Wire (BeCu)





- · HPGe testing at Boulby BUGS Facility.
- An empty spool of the same design used to perform blank subtraction.
- 567g of BeCu wire.
- Thanks to Paul Scovell & Emma Meehan from Boulby Lab.

#### **Dave Waters**



Wire Mass		
Wire diameter	0.1524	mm (0.06")
Wire length	27	km per APA
#APAs	150	APA per 10kt module
Total mass	616.9	kg per 10kt module

Wire Composition	n (Tempered, 2	5 Alloy - C17200 ?)
http://www.lfa-wire	.com/tempered-	alloy-25_c17200.htm
Cu	98.1	percent by weight
Be	1.9	percent by weight
Density	8.35	g/cm3



## DUNE APA Wire (BeCu)

Uranium series

234 B Uranhara

						23 23 23 23 23 23 23 23 23 23	There are a constrained of the c	broken cha	in
Radiopurity Resu	lts					-	218 A 1.5 see		
Chain/Isotope	Value	Uncertainty	Units	Limit ?	ppb		218 PO 2.1 min 218	164.3 Polonium	210 Poler 125 cay 210
U(early)	3000	-	mBq/kg		2.41E+02		Y A	T OF	
U(late)	4		mBq/kg	UL		_	214 83 23 mi	Bibreath 214 Bi Stay Da	is muth
Th(e)	100	6	mBq/kg			_	214 Pb 22.5 min Lead 214	211Pb 22.3 VV	State
Th(I)	114		mBq/kg			_		1 1 m	
K-40	45		mBq/kg				1,3 mà	The Burn 210	hallium 16
								at min 206	
Neutron Rates (pe	er 10kt module)		_		Nuclear Data				-
U-238 SF	2.07E-03	Hz			U-238 spontaneous	s fission BR	5.40E-05	%	
U-238 (a,n)	твс	Hz			U-238 n/fission		2.07		
					U-238 T_1/2		4.47E+09	yr	
	r 10kt module)								
Gamma Rates (pe	i Toke moduloj								

 ${}^{40}\mathrm{Ar}(n, 6.1 \mathrm{~MeV}){}^{41}\mathrm{Ar}$ 

#### **Dave Waters**