EIC Beamline R & D Status

Detector Support Group
February 22, 2023

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EIC

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- Presented to BNL/JLab engineers the initial Fluent simulation results of of ~5°C drop when adding a 1-mm aerogel layer around beampipe
- Ran thermal simulation with 5 mm of separation between the beampipe and silicon layer 1, with different thermal properties for the aerogel

		Aerogel Properties				
Air Velocity at Annulus & Enclosure [m/s]	**Temp. at Annulus & Enclosure [°C]**	**Density [Kg/m^3]**	**Thermal Cond. [W/m*K]**	**Mass [Kg]**	**Max. Si Sensor Temp. [°C]**	**Min. Si Sensor Temp. [°C]**
1.00E-07	20	50	0.0156	0.001613	99.7735	69.7811
		100		0.003227		
		150		0.004846		
		250		0.008067		
		50	0.014	0.001613	99.7648	69.5366
		100		0.003227		
		150		0.004846		
		250		0.008067		

- Calculated mass flow rates and heat transfer rates for different air flow velocities, using Ansys Fluent Flux

	Mass flow rate at inlet [Kg/s]		Heat transfer [W]
Airflow [m/s]	Annulus space	Enclosure	From beampipe
1	0.001195	0.033272	26.5557
5	0.005976	0.166363	46.4342