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Impact of polishing on the light scattering on aerogel surface.

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Particle identification power of modern developed aerogel RICH detectors strongly depends on optical quality of radiators. It was shown that wavelength dependence of aerogel tile transparency after polishing can not be described by standard Hunt formula. The Hunt formula has been modified to describe scattering in a thin layer of silica dust on the surface of aerogel tile. Several procedures of polishing of aerogel tile have been tested. The best result has been achieved while using natural silk tissue. The resulting block has optical smooth surfaces. The measured decrease of aerogel transparency due to surface scattering is about few percent. This result could be used for production of radiators for Focusing Aerogel RICH detectors.

Summary

Particle identification power of modern developed aerogel RICH detectors strongly depends on optical quality of radiators.

It was shown that polishing of aerogel with abrasive led to decrease of measured bulk light scattering length while using standard Hunt formula for fitting of the tile transparency dependence over wavelength. For this reason, the Hunt formula has been modified to describe scattering in a thin layer of silica dust on the surface of aerogel tile. An additional term with inverse square dependence on the wavelength was added. It was shown that the coefficient at this term described well the quality of polishing.

Due to the nature of manufacturing it is practically impossible to get aerogel tile with all flat, optically pure surfaces except upper face. Several procedures of polishing of aerogel tile have been tested. The best result has been achieved while using natural silk tissue. The resulting block has optical smooth surfaces. The measured decrease of aerogel transparency due to surface scattering is about few percent. This result could be used for production of radiators for Focusing Aerogel RICH detectors.

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