Cerenkov Counter for the G^0 backward angles measurements

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The main focus of the G^0 experiment is to separate the neutral weak form factors G_E^Z and G_M^Z of the nucleon, over the range of 0.1 - 1 $(GeV/c)^2$. This will allow us to determine the s quark contributions to the charge and magnetization densities of the nucleon. For this purpose, parity-violating asymmetries in elastic electron scattering have been measured very recently at forward angles over the full range of momentum transfer 0.1 - 1 $(GeV/c)^2$ and will be measured at backward angles for 0.3, 0.5 and 0.8 $(GeV/c)^2$. At backward angles we will be sensitive to the axial form factor which is not well known. Thus, we will also have to measure quasi-elastic scattering from a deuterium target at backward angles, to extract precisely this axial form factor. However, negatively charged pions have been found to produce a significant background to the elastic and quasi-elastic rates detected by the G^0 spectrometer, especially when running on deuterium target. To achieve a satisfactory discrimination between elastic electrons and background rates an Aerogel Cerenkov Counter will be used. The LPSC Grenoble is involved in the conception and the building of 4 of the 8 Cerenkov counters needed.
The aerogel radiator refractive index was fixed by the momentum distribution of the π^- distributions. The geometry of the final counter was studied and optimized by using simulation (Geant, Litrani) validated with measurements made on a small prototype. Currently, all the optical and mechanical properties are well defined and the 4 Cerenkov counters are already built. The poster will present the final Cerenkov counter geometries and then the optical materials used. It will also display a brief summary of tests on the efficiency obtained with cosmic rays and tests performed at LCMI (Grenoble), relating to the magnetic shielding of the photo-multipliers, important because the counters will be in the fringe field of the G^0 magnet.