# The drift chamber of CMD-3 detector

G. Chiarello[d], A. Corvaglia[c], F. Cuna[a],[c], N. De Filippis [b],[d], E. Gorini[a],[c], F. Grancagnolo[c], A. Miccoli[c], M. Panareo[a],[c], M. Primavera[c], G. F. Tassielli [b],[e], A. Ventura[a],[c]

(a) Dipartimento di Matematica e Fisica, Università del Salento, Italy; (b) Istituto Nazionale di Fisica Nucleare, Bari, Italy; (c) Istituto Nazionale di Fisica Nucleare, Lecce, Italy; (d) Istituto Nazionale di Fisica Nucleare, Pisa, Italy; (d) Politecnico di Bari; (e) Università degli Studi di Bari »Aldo Moro»

**TraPId** (**Tra**cking and **P**article **Id**entification), the Central Tracker proposed by the Bari and Lecce INFN groups for the detector at a generic flavour factory is an ultra-light drift chamber equipped with cluster counting/timing readout techniques.

Main peculiarities of this design are the **high transparency** in terms of multiple scattering contributions to the momentum measurement of charged particles and the very promising particle identification capabilities.

## HIGH TRANSPARENCY

A significant reduction in the amount of material at the end plates is obtained by separating the gas containment function from the wire tension support function.
The wires are anchored to a self-sustaining light structure ("wire-cage") surrounded by a thin skin ("gas vessel") of suitable shape to compensate for the gas differential pressure with respect to the outside.
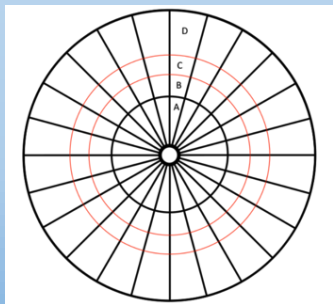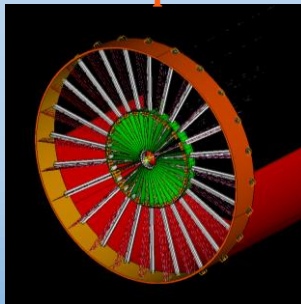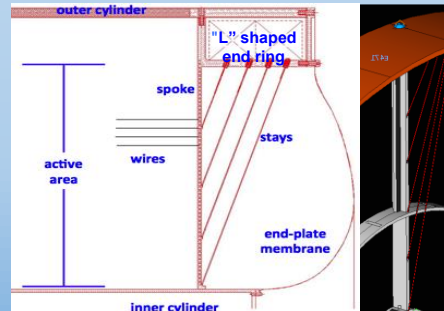
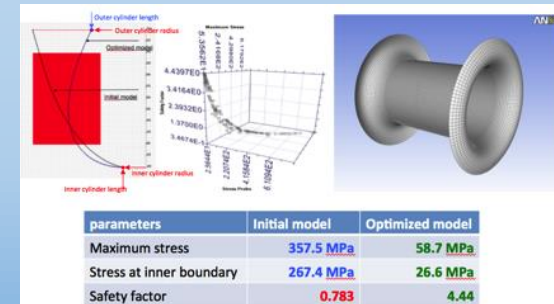**Wire-cage**
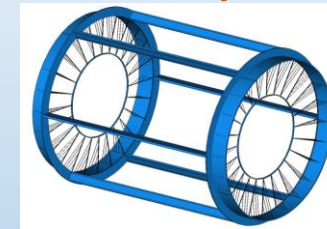


**Gas vessel**
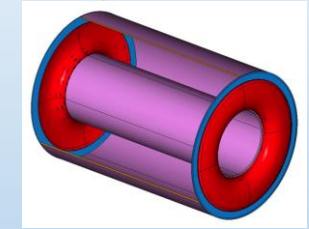


**Chamber layout**



**The missing end-plate**



**The tension recovery scheme**



**The gas containment**



| parameters | Initial model | Optimized model |
|---|---|---|
| Maximum stress | 357.5 MPa | 58.7 MPa |
| Stress at inner boundary | 267.4 MPa | 26.6 MPa |
| Safety factor | 0.783 | 4.44 |

**Preliminary Finite Element Analysis**
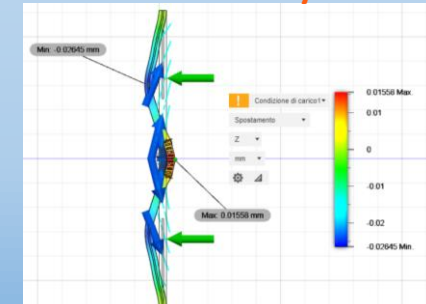


- An ultra-low mass drift chamber for a generic flavour factory with a material budget $<1.5 \times 10^{-2} X/X_0$ in the radial direction and $<5 \times 10^{-2} X/X_0$ in the forward and backward directions (including HV and FEE services) can be built with the novel technique adopted for the successful construction of the MEG2 drift chamber.
- $\Delta pt/pt = 2.0 \times 10^{-3}$, $\Delta\theta = 0.70$ mrad, $\Delta\phi = 0.78$ mrad at p = 1 GeV/c.
- Particle identification at the level of 3.6% with cluster counting allowing for π/K separation ≥ 3σ over a wide range of momenta.