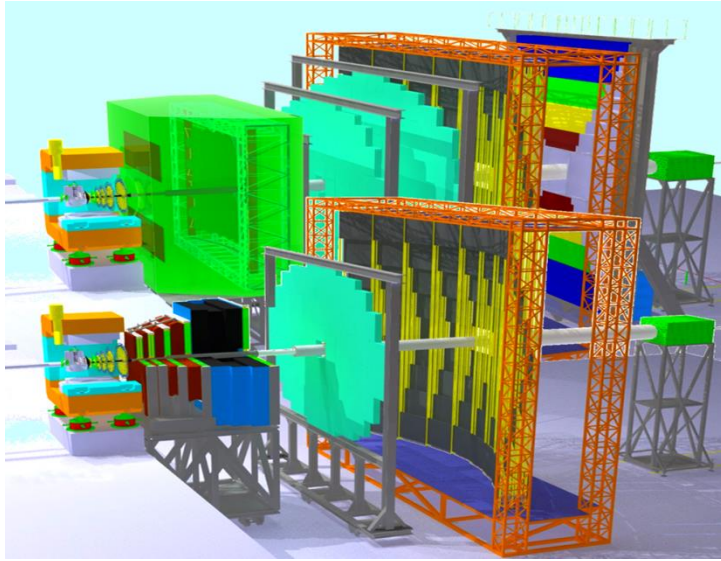


**Proiect PN09370103: Fizica starilor extreme ale materiei,  
a proprietatilor si dinamicii acestora  
Director de proiect: Prof. Dr. Mihai Petrovici**

**OPTIMIZAREA ARHITECTURII MODULELOR DIN ZONA INTERNA A  
SUBDETECTORULUI DE TIMP DE ZBOR (TOF) PENTRU CBM**

**PROIECTAREA STRUCTURII MECANICE SI A CONEXIUNILOR  
ELECTRONICE DE TRANSPORT A SEMNALELOR**

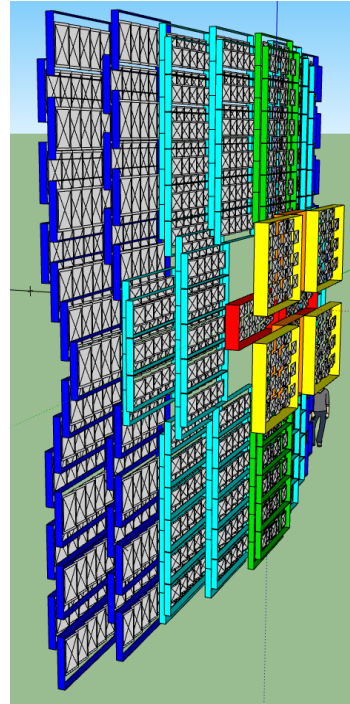
06.11.2014



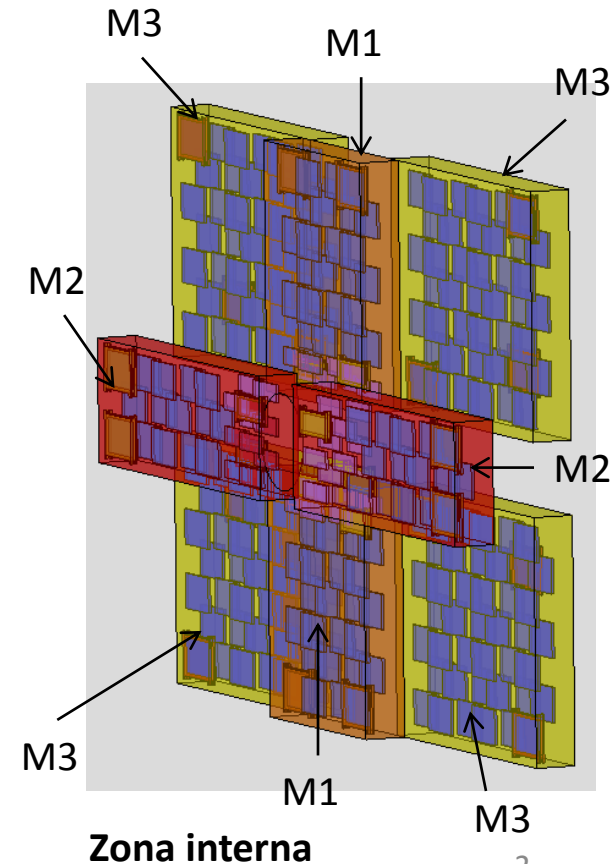
**Versiuni ale aranjamentului experimental CBM**

Pentru acoperirea zonei interne, la unghiurile polare mici, a fost dezvoltat un prototip care să facă față unor rate de numărare de până la  $25\text{kHz/cm}^2$ , prototip bazat pe folosirea unei sticle speciale, cu rezistivitate scăzută ( $\sim 10^{10}\ \Omega\text{cm}$ ) în comparație cu cea a sticlei normale ( $\sim 10^{13}\ \Omega\text{cm}$ ).

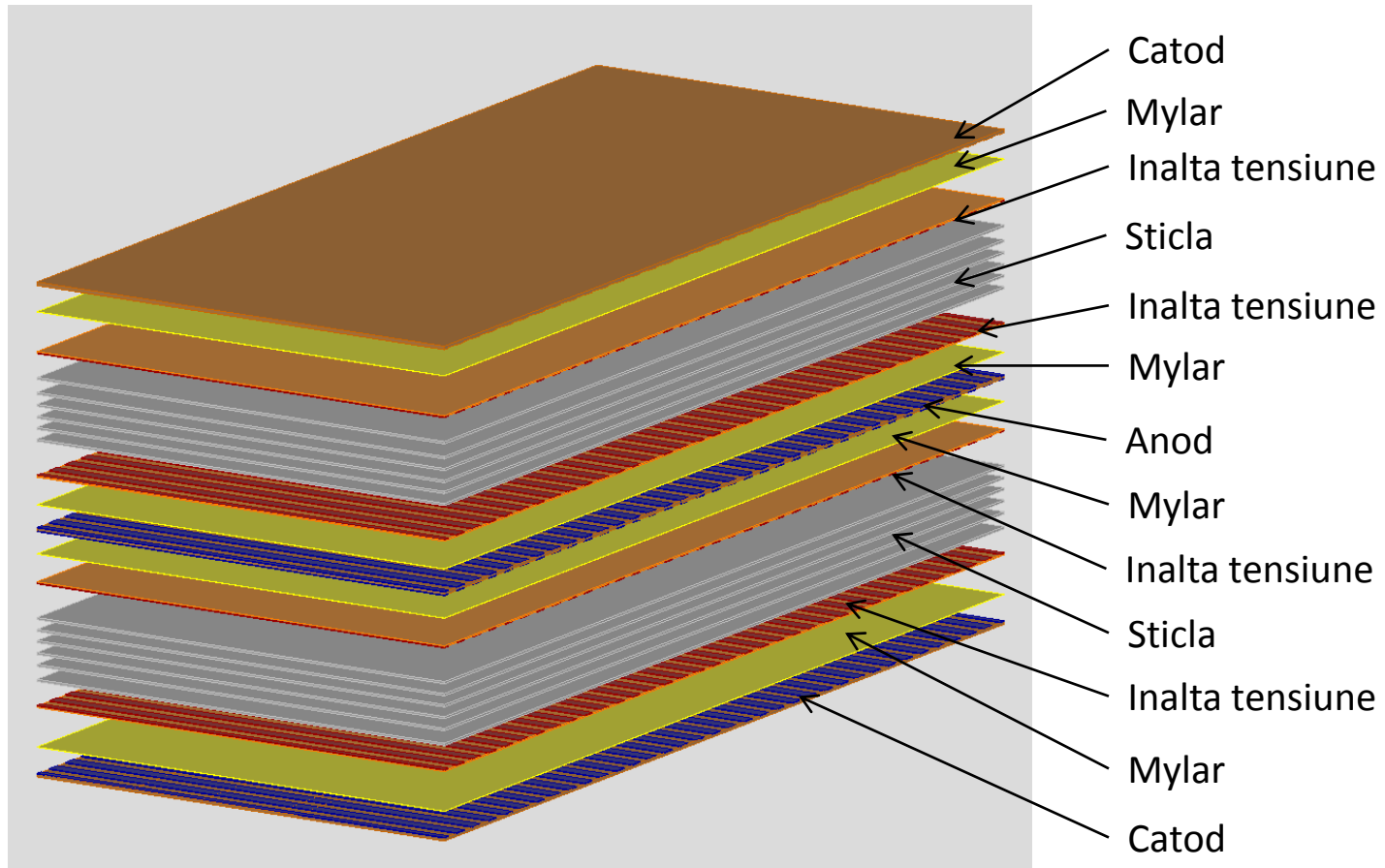
## ***Zona internă a subdetectorului RPC-TOF***



**Subdetectorul CBM-TOF**

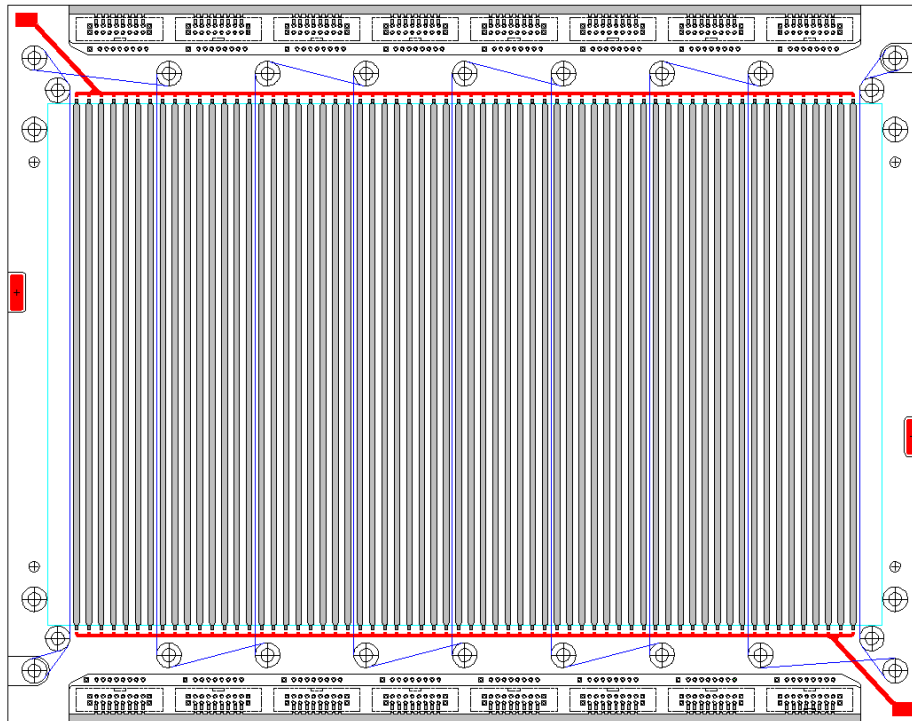


## Structura interna a prototipului MRPC

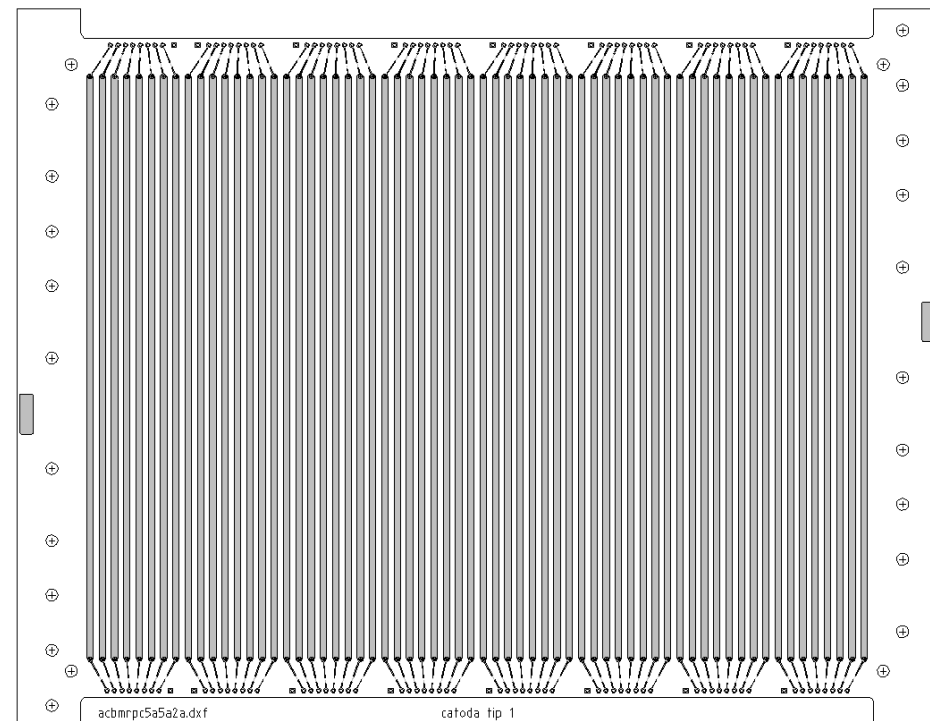


## Structura interna a prototipului MRPC

- Latimea si periodicitatea (pasul) stripurilor au fost stabilite astfel incat sa satisfaca cerinta de adaptare cu impedanta de 100Ohm a electronicii front-end  
pasul (4.72mm) = latimea stripului (2,18mm) + distanta dintre stripuri(2,54 mm)
- Semnalele stripurilor de la anod si respectiv catodi sunt transmise catre conectori prin trasee metalice, fiecare strip fiind citit la ambele capete. Preluarea semnalului furnizat de detector se face prin citire diferentiala, adica citirea simultana a semnalelor furnizate atat de anod si de cei doi catodi.

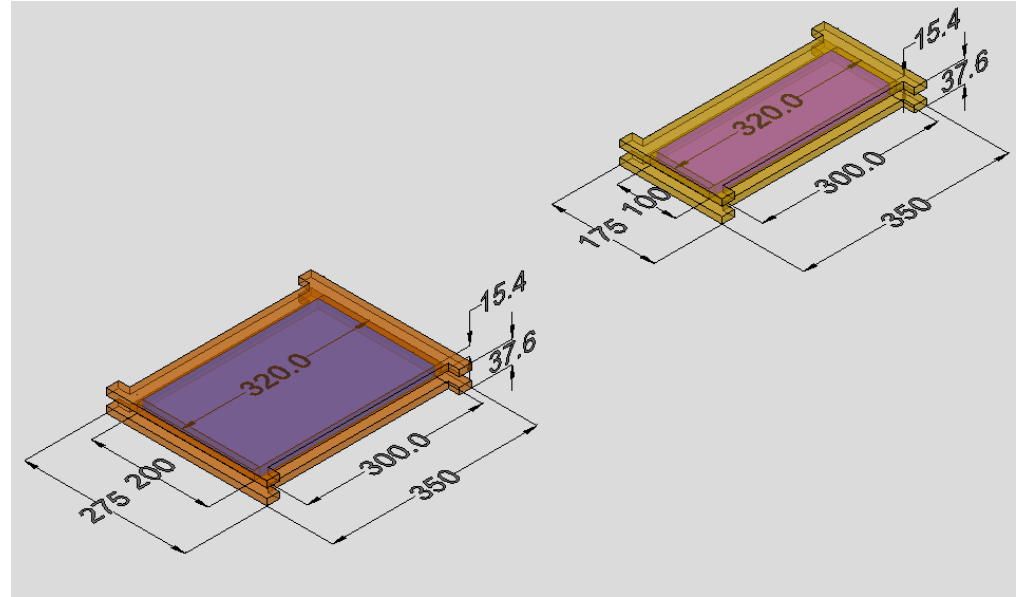
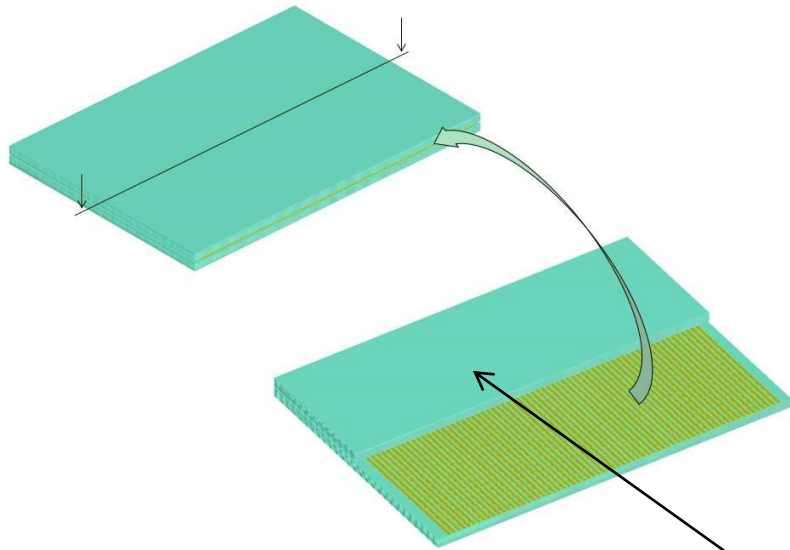


Conectorii de semnal fixati pe anod

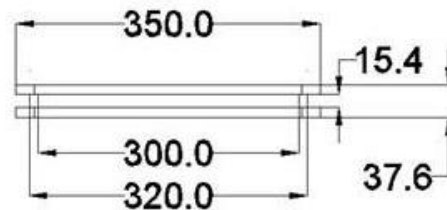
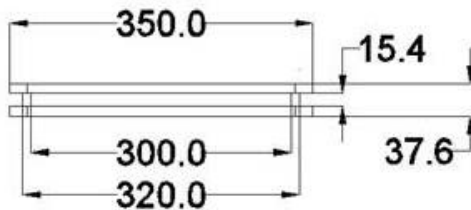
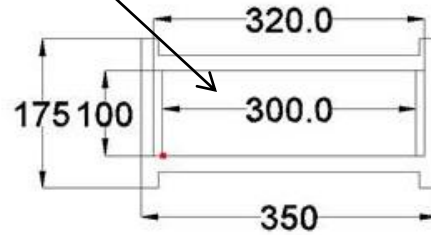
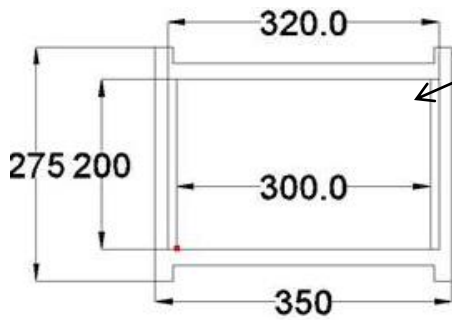


Trasee de conectare a stripurilor la catod

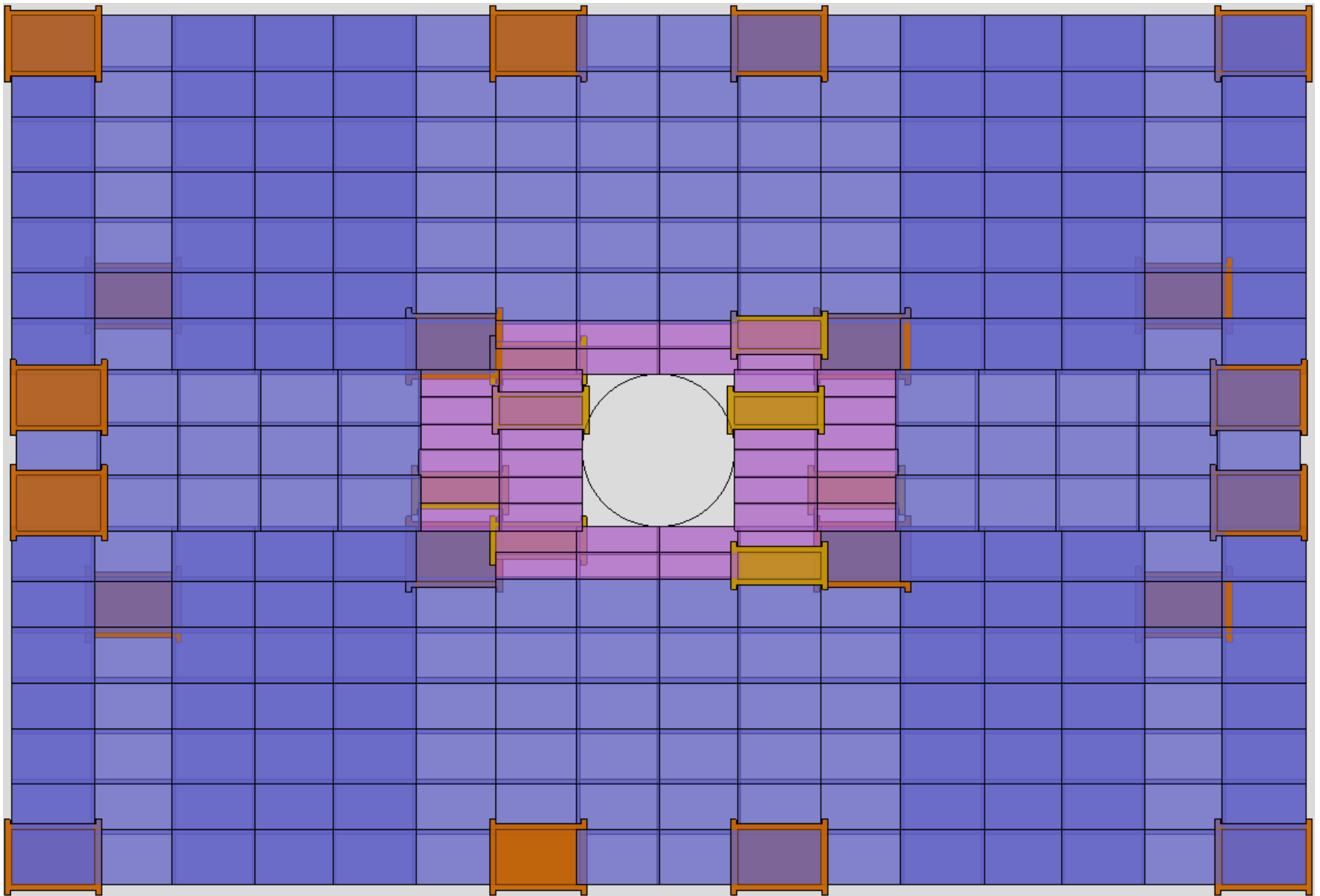
# Dimensiuni zona activa si detectori



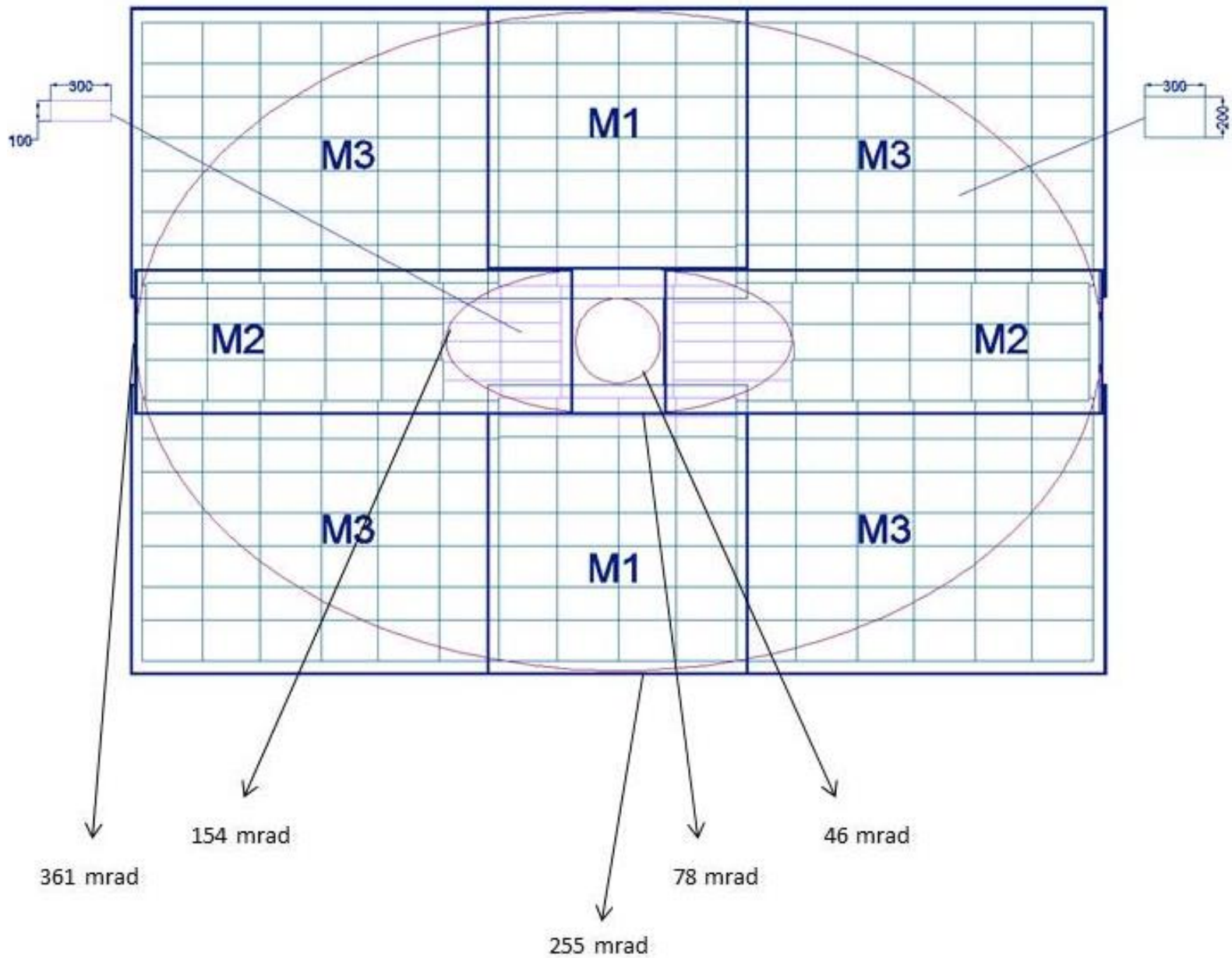
Zona activa



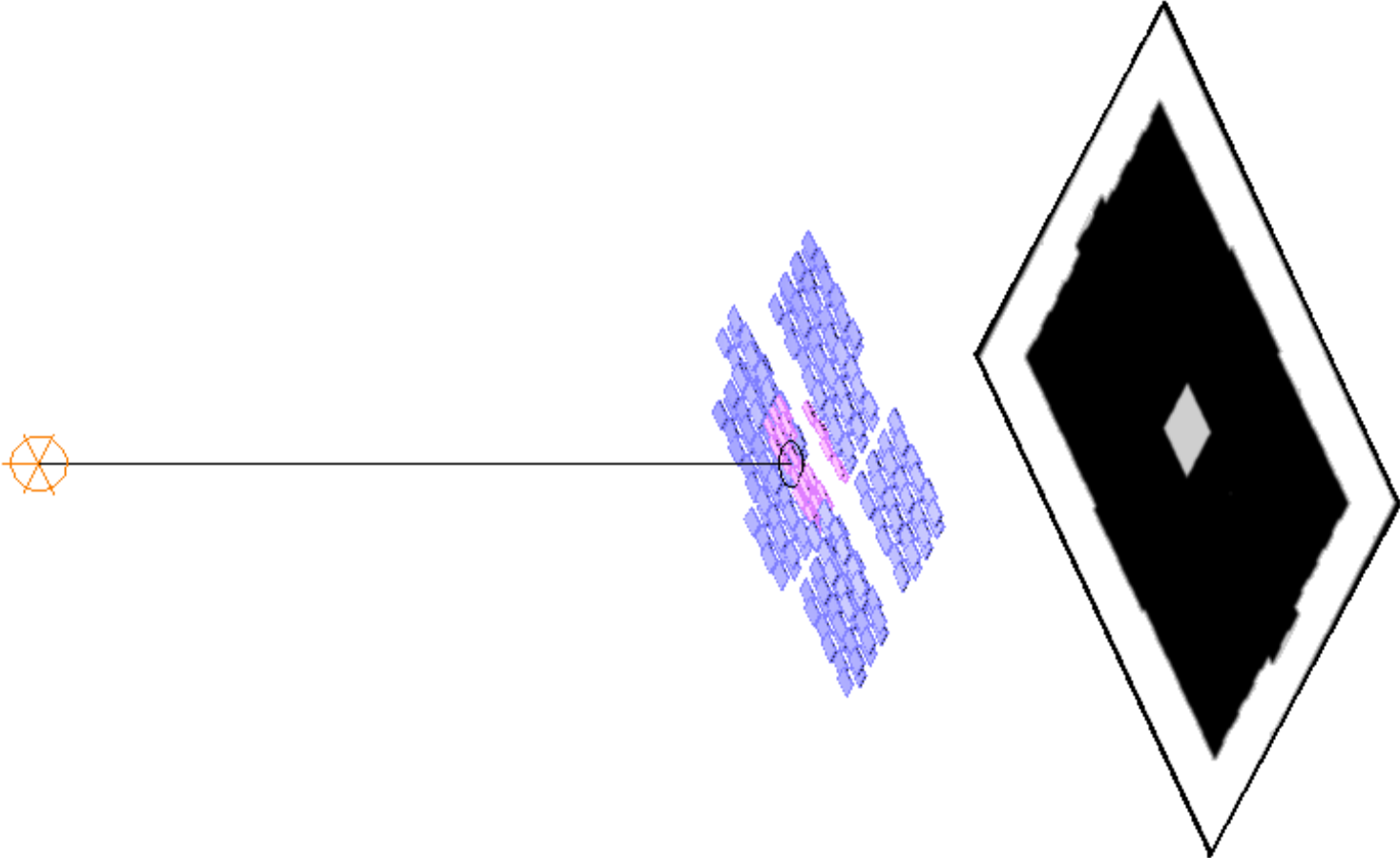
## Ocuparea peretelui RPC-TOF in zona interna cu celule de 200 si 100



## Ocuparea peretelui RPC-TOF in zona interna cu celule de 200 si 100

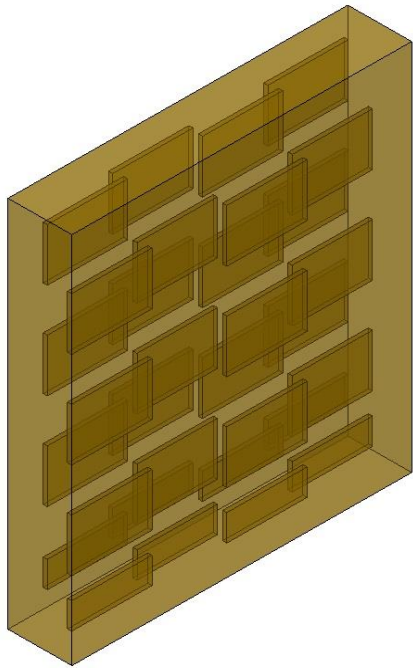


***Amplasarea spatiala a celulelor si verificarea opacitatii***



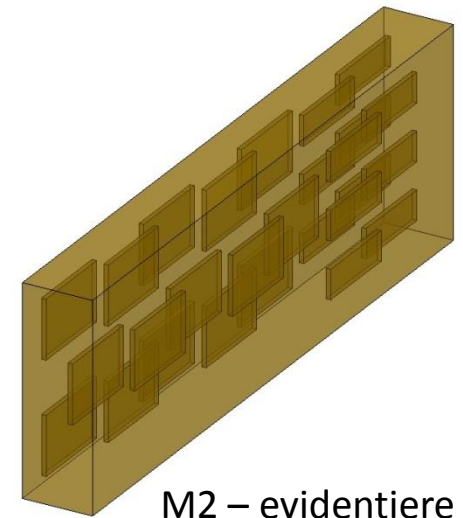
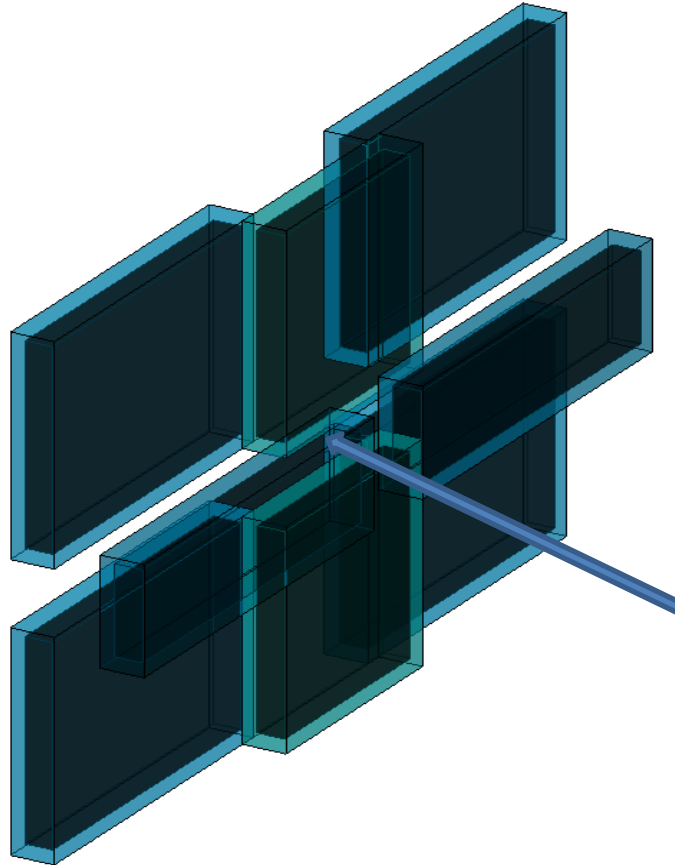




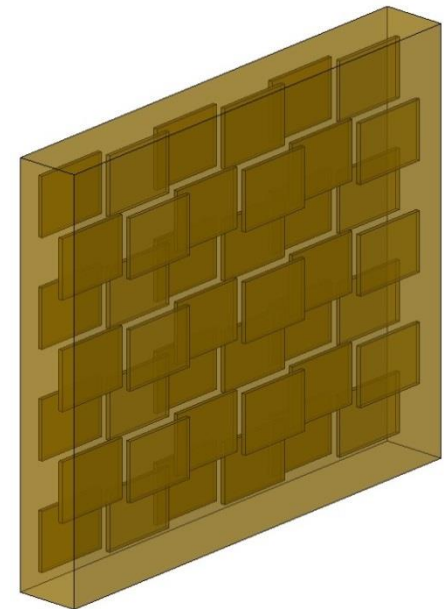


M1 – evidentiere  
suprapunerea  
zonelor active

Suprapunerea modulelor si succesiunea  
lor dinspre tinta: M2, M1, M3



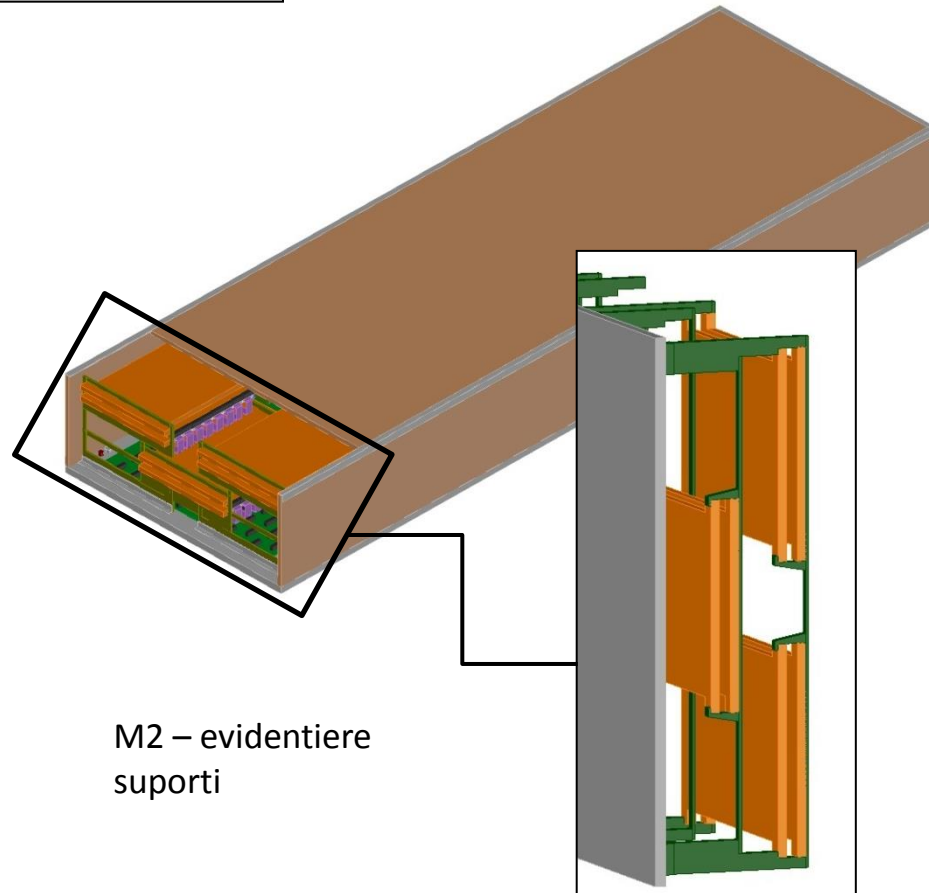
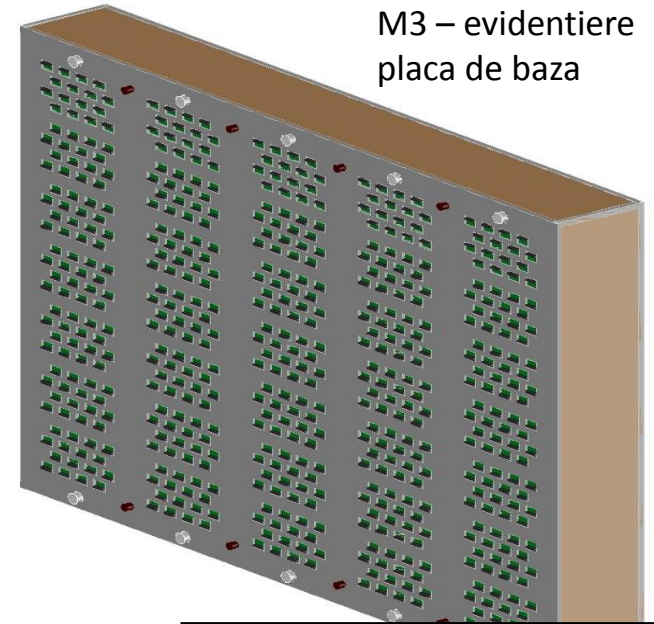
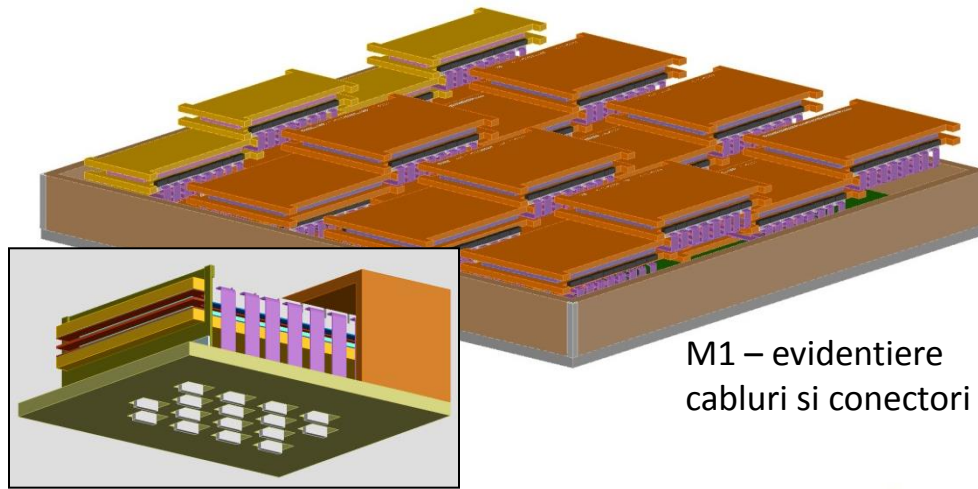
M2 – evidentiere  
suprapunerea  
zonelor active



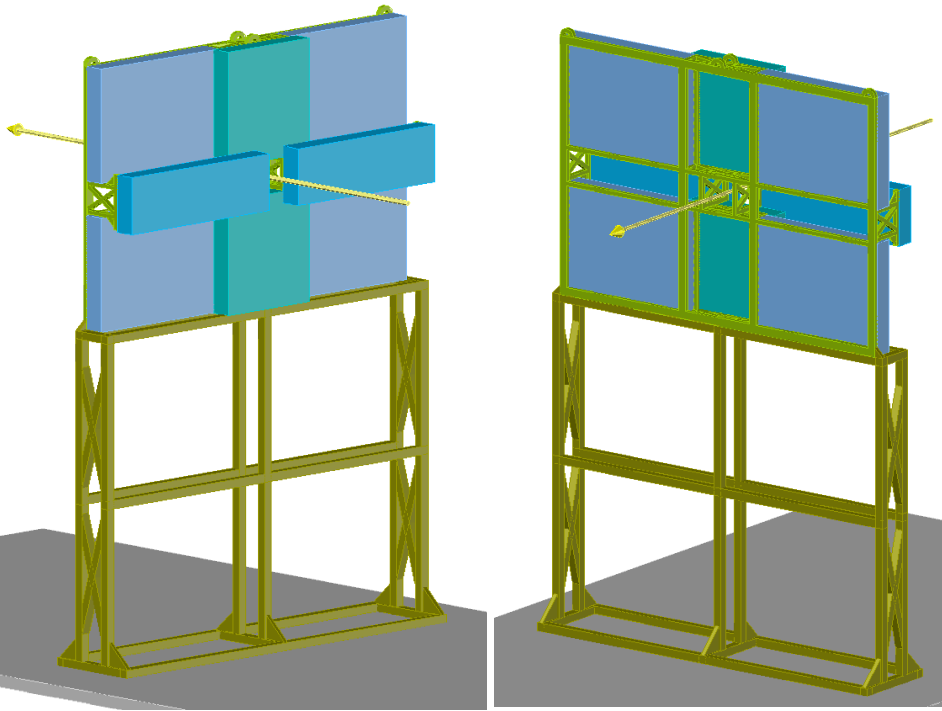
M3 – evidentiere  
suprapunerea  
zonelor active

***Zone active in module***

## Detalii constructie module

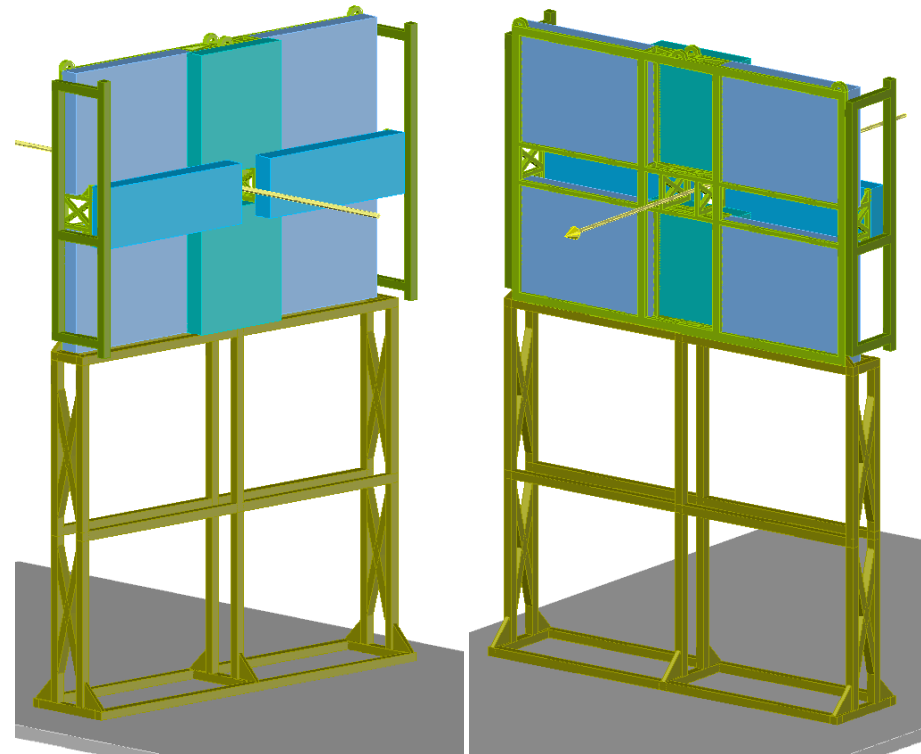


***Suport mecanic pentru mentinerea in fascicul a modulelor care acopera zona interna***



Suport mecanic independent

Suport mecanic de conexiune



## **Concluzii**

- Pentru zona interna a subdetectorului de timp de zbor au fost proiectate 3 tipuri de module: M1, M2 si M3, modulul fiind unitatea de baza care este independenta din punct de vedere electric si mecanic pentru a fi implementate intr-o structura mecanica de sustinere;
- Modulele proiectate pentru zona interna contin detectori de tip MRPC si electronica asociata;
- Detectorii MRPC sunt bazati pe electrozi rezistivi realizati din sticla speciala de rezistivitate joasa, pentru a face fata fluxului de particule foarte mare, de pana la  $25\text{kHz}/\text{cm}^2$  anticipat pentru zona interna a subdetectorului CBM-TOF;
- Cu ajutorul metodei sursei de lumina au fost optimizate zonele de suprapunere dintre detectorii MRPC si respectiv dintre cele 8 module care acopera zona interna a subdetectorului CBM-TOF, astfel incat sa se asigure o acoperire uniforma si continua si in acelasi timp sa se minimizeze costurile si bugetul de material;
- A fost proiectata de asemenea, o structura mecanica de sustinere care sa asigure pozitionarea corecta si solidara cu zona externa a subdetectorului CBM-TOF.

Rezultatele continute in acest raport de etapa stau la baza unor capitole importante de TDR (Technical Design Report) al CBM-TOF si au fost publicate in rezumat in lucrarea:

*“The CBM Time-of-Flight wall - A conceptual design”*

I. Deppner, N. Herrmann, A. Akindinov, D. Bartos, A. Balaceanu, S. Belogurov, P. Cao, G. Caragheorghopol, H. Chen, J. Cheng, M. Ciobanu, F. Constantin, Z. Deng, H. Deppe, V. Duta, H. Fan, H. Flemming, J. Frühauf, J. Gebelein, K. Heidel, K. Hildenbrand, U. Keschull, M. Kiš, S. Kiselev, K. Koch, P. Koczon, R. Kotte, A. Laso Garcia, J. Lehrbach, C. Li, Y. Li, P.-A. Loizeau, P. Lv, D. Malkevich, S. Manz, L. Naumann, A. Nedosekin, W. Niebur, A. Oancea, M. Petris, M. Petrovici, V. Plotnikov, M. Prokudin, L. Radulescu, M. Shao, V. Simion, C. Simon, R. Sultanov, Y. Sun, Z. Tang, Y. Wang, J. Wüstenfeld, C. Xiang, N. Xu, Y. Zhang, D. Zhou, X. Zhu

*Journal of Instrumentation, Volume 9, October 2014*



Va multumesc!