Projeto Temático
2020/04867-2
V Reunião Geral - 22/02/2023
Working Group - 1

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Objetivos do *Working Group* 1

- **Strong Sector of the Standard Model**
- **ALICE data analysis and detector upgrade**
- Experimental Study of the Quark-Gluon Plasma Properties
  - Strangeness Production in Relativistic Heavy Ion Collisions
  - Quark-Gluon Plasma Tomography with Hard Probes
- The ALICE Experiment Upgrade
  - ALICE-TPC *Aging Studies*
  - ALICE Forward Calorimeter
  - ALICE 3

Resultados Esperados

- Análises realizadas (com notas e participação nos comitês de elaboração de artigos)
- Apresentações em conferências representando as colaborações
- Posições de liderança dentro das colaborações
- Artigos fenomenológicos interpretando os dados

Cronograma WG-1

Activity	1st Y	2nd Y	3rd Y	4th Y	5th Y
1. Experimental Study of the Quark-Gluon Plasma Properties					
Strangeness Enhancement (Run 2 data)	X	X	X		
Strangeness Enhancement (Run 3 data)		X	X	X	X
Heavy Quark Jet Inclusive Measurements (Run 2 data)	X	X			
Heavy Quark Production Precision Measurements (Run 3 data)			X	X	X
Heavy Quark Jet Shape Studies (Run 3 data)			X	X	X

7. ALICE Upgrade Activities					
Construction of a degradation chamber	X				
Development of DRS as a tool for the ALICE TPC diagnostics		X	X	X	
Studies of gaseous chemical reactions and outgassing			X	X	X
Studies of the HGCROC performance	X				
Contribution to the design of PAD readout; validation of prototypes; TDR	X	X	X		
Production and test of PAD readout front-end electronics			X	X	
Contribution to FoCal construction				X	X

Resultados

Strangeness Production in Relativistic Heavy Ion Collisions

- **Reconstrução de hipernúcleos usando redes neurais no Alice**
  - Início da análise por Maria Paula Palhares (IFUSP) - estágio de 2 anos no CERN

Quark-Gluon Plasma Tomography with Hard Probes

- Heavy quark jet inclusive measurements (Run 2)
  - J/Ψ jet fragmentation function:
    - Fase final da tese de Fábio Canedo (IFUSP)
    - Apresentação da Cristiane Jahnke
  - Identificação e tagging de jatos através de algoritmos de deep learning para imagens em colisões ultra-relativísticas
    - Início da análise por Jhoão Gabriel (IFUSP)

Quark-Gluon Plasma Tomography with Hard Probes

- Heavy quark jet inclusive measurements (Run 2)
  - Subestrutura de jatos de quarks pesados usando elétrons como tagging
    - Leonardo Barreto (IFUSP)
    - Participará da finalização da análise dos dados do Run 2 durante estágio em Munster-Alemanha
    - Visa apresentação na conferência *Hard Probes* no Japão em setembro e publicação de artigodo ALICE até o final do ano

Quark-Gluon Plasma Tomography with Hard Probes

- Heavy quark jet inclusive measurements
  - Estudo fenomenológico dos modelos JEWEL+vUSPhydro: Fabio Canedo, Leonardo Barreto e Monalisa Melo (IFUSP)
    - Dissertação de mestrado da Monalisa defendida em outubro
    - Um artigo submetido e outro em preparação
    - Apresentação submetida para o SQM2024 em junho por Leonardo Barreto

ALICE-TPC *Aging Studies*

- Construction of a degradation chamber (Ano 1)
- Development of DRS as a tool for the ALICE TPC diagnostics
  - Tiago Silva (IFUSP)
  - Relato na apresentação do WG-5.1

ALICE Forward Calorimeter

- Studies of the HGCROC performance (Ano 1)
- Contribution to the design of PAD readout; validation of prototypes; TDR
  - Marco Bregant (IFUSP), Cristiano Krug (UFRGS), Mauro Cosentino (UFABC) e Beatriz Gay (UFRGS)

The Brazilian groups involved in several aspects of the FoCal project:

- management
- integration
- Pad readout electronic studies
- Physics simulations

next slides

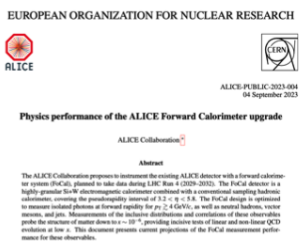
Status - TDR and related publications

- Letter-of-Intent — CERN-LHCC-2020-009
- Physics of the ALICE Forward Calorimeter upgrade — ALICE-PUBLIC-2023-001
- Performance of the ALICE Forward Calorimeter upgrade — ALICE-PUBLIC-2023-004
- Prototype electronics for the silicon pad layers of FoCal — 2023 JINST 18 P04031
- Test beam paper of FoCal prototypes (2021-2023) — arXiv:2311.07413
- Technical Design Report (internal) — to be submitted to JINST by spring 24
  https://twiki.cern.ch/twiki/bin/view/ALICE/FoCalTDRtwiki

v0.5 released the 12/02/24, opened for the ALICE Collaboration review


Prototype electronics for the silicon pad layers of the future Forward Calorimeter (FoCal) of the ALICE experiment at the LHC


EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH
ALICE-PUBLIC-2023-001
12 May 2023
Physics of the ALICE Forward Calorimeter upgrade
ALICE Collaboration

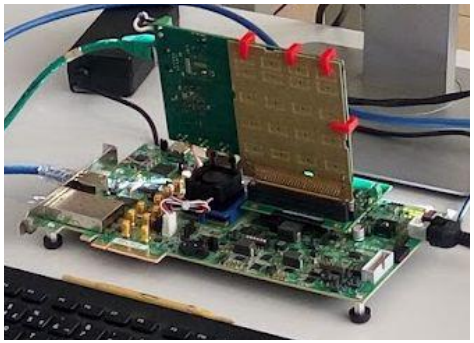

EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH
ALICE-PUBLIC-2023-004
04 September 2023
Physics performance of the ALICE Forward Calorimeter upgrade
ALICE Collaboration

TDR was an hectic activity in the last six months!
A researcher of the Temático was in charge of the "Integration" chapter redaction.

HGCROC caracterization (and configuration) studies

mainly C. Krug & students

HGCROC testbench @ HEPIC



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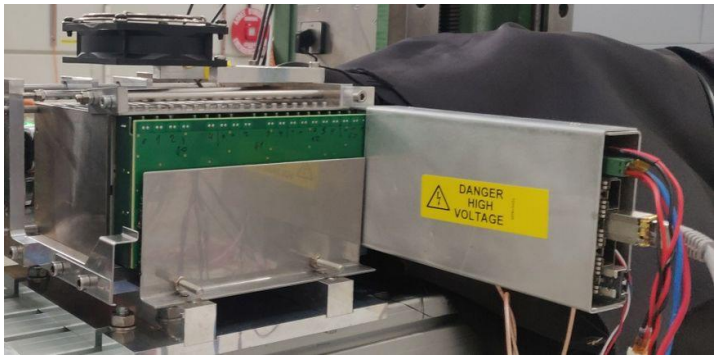
FoCal prototype @ CERN (18 HGCROCs)



https://cds.cern.ch/record/2812555

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DAC scan	

FoCal heavy meson identification capabilities

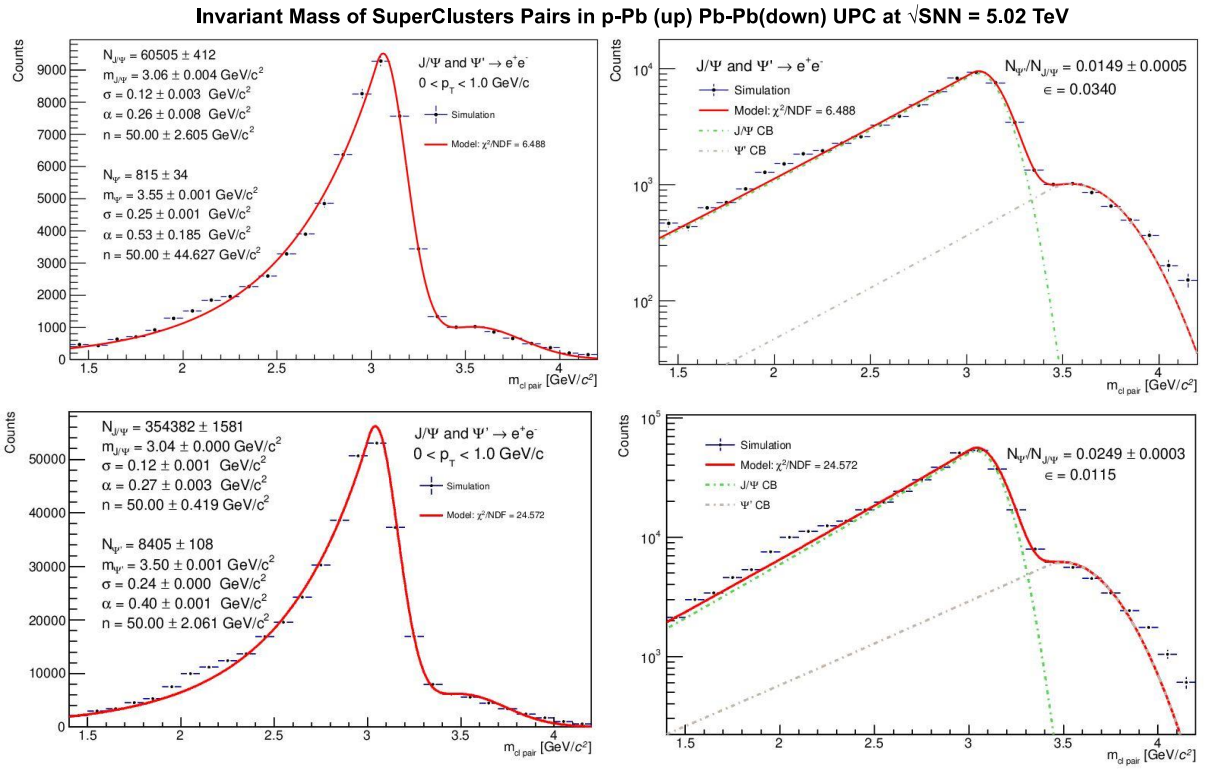
Paulo Fetter Master's work

Simulation

- Simulation using STARlight to generate J/Ψ and Ψ' events.
- The data is grouped into superclusters and matched with the physical primary particles.
- The Crystal Ball (CB) function is used to fit the invariant mass data.

Summary

- Perform analysis and invariant mass reconstruction for incoherent production.
- Explore increased statistics in coherent production for more significant contributions.



ALICE 3

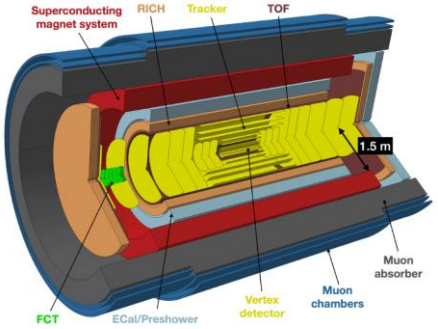
- Detector configuration studies
  - Dissertação de mestrado de Levi Stahl (IFUSP)
  - Contribuição para a otimização sistema ToF do detetor ALICE3

The HEPIC in the ALICE 3 TOF collaboration

Participation on the 10/2023 test beam

Measurements of time resolution at CERN's PS (proton synchrotron)
- 10 GeV/c

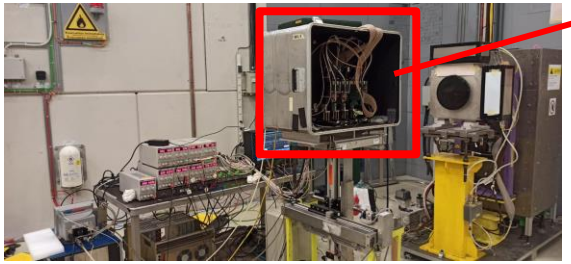
Results under analysis - paper on the way

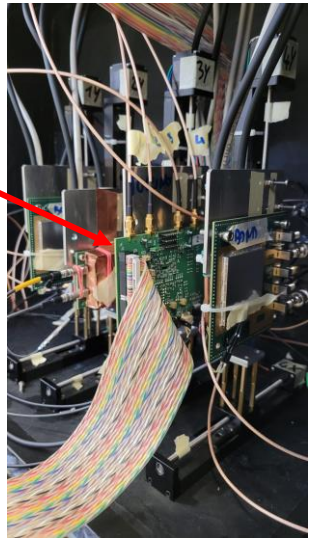


ALICE 3 experiment layout. (Image: CERN)

MadPix - **M**onolithic CMOS **A**valanche **D**etector **PIX**elated Prototype for ps Timing Application

First prototype with integrated electronics (LFoundry 110 nm) and sensor gain
Active thickness: 48µm

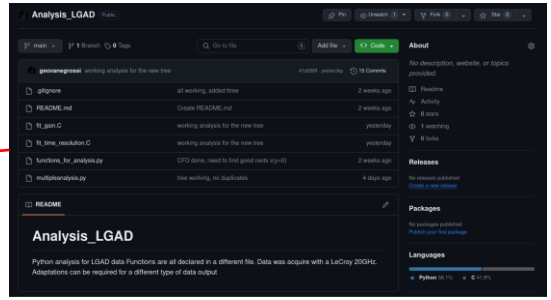




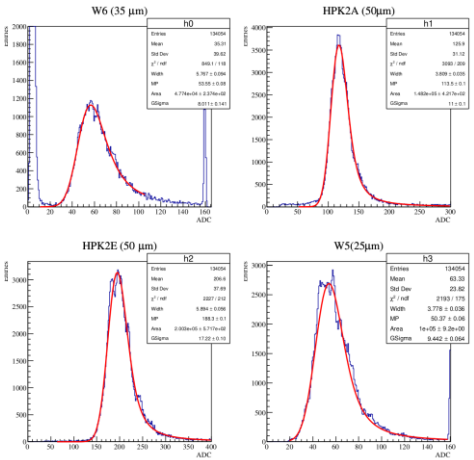
Other contributions: New analysis tools based on PyROOT

You will find:

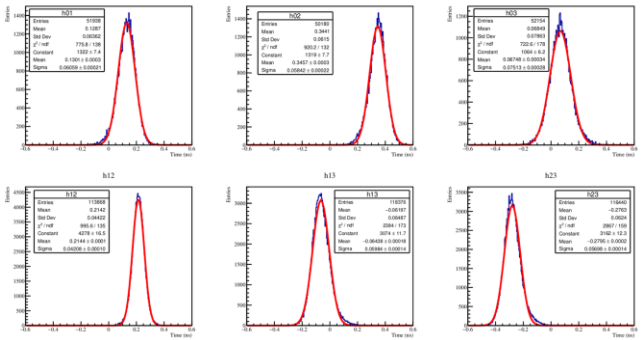
Energy spectrum and gain/MPV calculations macro



Available at: ALICE3 TOF gitlab repository



CFD/Time difference calculation and time resolution



Also new digitizer decoder:

Decoder for the new digitizer that will be used in the next TB - 07/2024 ~ 10/2024

Integrated with the old analysis tool