

FCPPL – ALICE project

Study of QCD matter with the ALICE detector

N. Bastid, LPC Clermont-Ferrand, France

7th FCPPL workshop, Clermont-Ferrand, France, April 8-10, 2014

Outline:

- ☐ A brief history of the collaboration
- ☐ FCPPL ALICE report (2013)
- ☐ FCPPL ALICE project (2014)



Pb+Pb @ $\sqrt{s} = 2.76$ ATeV

2010-11-08 11:30:46

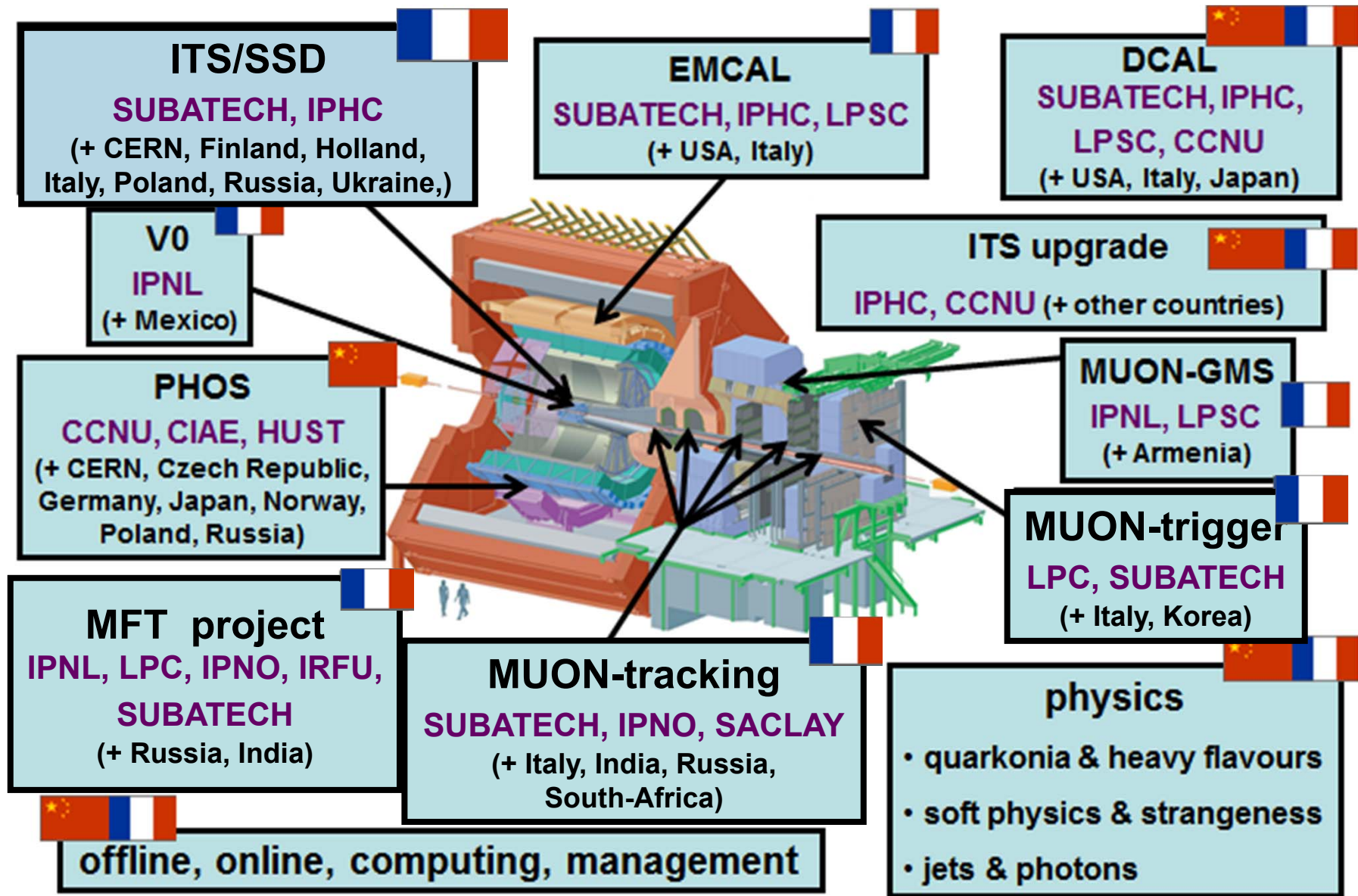
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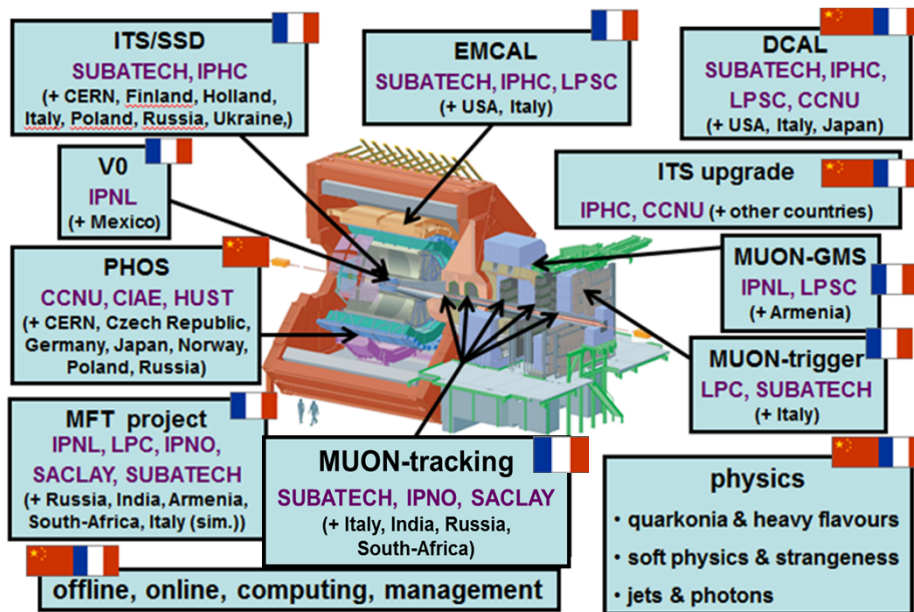
Contributions from China and France in ALICE





ALICE groups of China and France: a brief history of our collaboration within FCPPL (I)

strong cooperation program between the ALICE groups from institutes of CCNU-Wuhan (China) and IN2P3/CEA (France) since many years



- **data analysis**
 - ✓ heavy-flavour decay muon measurements
 - ✓ W^\pm -boson production via single muons
 - ✓ low mass resonances via dimuons
 - ✓ γ and neutral meson production
 - ✓ γ (π^0)-hadron correlation studies
- **performance studies**
 - ✓ open heavy-flavours with MUON and Muon Forward Tracker (MFT) ,
 - ✓ jets, photons with EMCal, DCAL and PHOS
- **offline, online, computing, management**
- **R&D and detector installation/operation (DCAL and PHOS)**

- numerous presentations in ALICE meetings, international conferences
- numerous contributions in publications, conference proceedings, internal/analysis ALICE notes
- organization of the 2nd FCPPL workshop (CCNU-Wuhan) and 7th FCPPL workshop (UBP/LPC Clermont-Ferrand)



ALICE groups of China and France: a brief history of our collaboration within FCPPL (II)

❑ Co-PhD students

name	place	date	funding
Yaxian MAO	LPSC Grenoble/CCNU	2008-2011	CSC scholarship (3 years)
Renzhuo WAN	IPHC Strasbourg/CCNU	2008-2011	CSC scholarship (3 years)
Xiaoming ZHANG	LPC Clermont-Ferrand/CCNU	2009-2012	French Embassy, FCPPL & LPC
Shuang LI	LPC Clermont-Ferrand/CCNU	2012-2015	CSC scholarship (2 years)
Mengliang WANG	Subatech-Nantes	2012-2015	CSC scholarship (3 years)
Jianhui ZHU	Subatech-Nantes/CCNU	2013-2016	CSC scholarship (2 years) & Eiffel

❑ Post-doctoral positions

name	place	date	funding
Liang SUN	IPN Lyon	2009	CNRS
Hongyan YANG	IRFU Saclay	2011-2012	CEA
Xiaoming ZHANG	LPC Clermont-Ferrand	2012 (3 months)	CNRS



ALICE groups of China and France: a brief history of our collaboration within FCPPL (III)

❑ Master students

name	place	date	funding
Hengtong DING	Subatech-Nantes	2007, 1 month	French Embassy
Yaxian MAO	Subatech-Nantes	2007, 1 month	French Embassy
Xiaoming ZHANG	LPC Clermont-Ferrand	2008, 3 months	French Embassy
Jiebin LUO	LPC Clermont-Ferrand	2010, 3 months 2011, 6 months	FCPPL, UBP & LPC
Jianhui ZHU	LPC Clermont-Ferrand	2011, 5 months	FCPPL, UBP & CCNU
Zuman ZHANG	LPC Clermont-Ferrand	2013, 3 months	FCPPL, UBP

❑ many visits of senior physicists & engineers/technicians (France and China) for cooperation work on data analysis & detector related activities



FCPPL-ALICE project

PART-CCNU-IN2P3-ALICE: Study of QCD matter with the ALICE detector

French Group			Chinese Group		
Name	Title	Affiliation (institute)	Name	Title	Affiliation (institute)
<i>Leader</i>			<i>Leader</i>		
Bastid Nicole	PR	IN2P3	Zhou Daicui	PR	CCNU
Aphécetche Laurent	CR	IN2P3	Cai Xu	PR	CCNU
Baldisseri Alberto	Physicien	IRFU	Yang Chumbin	PR	CCNU
Batigne Guillaume	MC	IN2P3	Yin Zhongbao	PR	CCNU
Castillo Castellanos Javier	Physicien	IRFU	Bartalini Paolo	PR	CCNU
Cheshkov Cvetan	CR	IN2P3	Liu Fuming	PR	CCNU
Cheynis Brigitte	CR	IN2P3	Zhou Daimei	PR	CCNU
Conessa-Balbastre Gustavo	CR	IN2P3	Wang Yaping	Ass. PR	CCNU
Crochet Philippe	CR	IN2P3	Pei Hua	Ass. PR	CCNU
Ducroux Laurent	MC	IN2P3	Zhang Fan	Lecturer	CCNU
Dupieux Pascal	DR	IN2P3	Wang Dong	Lecturer	CCNU
Erazmus Barbara	DR	IN2P3	Zhu Jianlin	Lecturer	CCNU/SCUEC
Estienne Magali	CR	IN2P3	Xiang Changzhou	Lecturer	CCNU
Faivre Julien	MC	IN2P3	Mao Yaxian	Post-doc	CCNU/UV
Furget Christophe	PR	IN2P3	Zhang Xiaoming	Post-doc	CCNU/LBNL
Germain Marie	CR	IN2P3	Zhang YongHong	PhD student	CCNU
Guernane Rachid	CR	IN2P3	Zhu Hongsheng	PhD student	CCNU
Kov Serge	DR	IN2P3	Zhou Fengchou	PhD student	CCNU
Martinez-Garcia Ginés	DR	IN2P3	Wang Mengliang	PhD student	CCNU
Pereira Hugo	Physicien	IRFU	Zhu Xiangrong	PhD student	CCNU
Pillot Philippe	CR	IN2P3	Li Shuang	PhD student	CCNU
Réal Jean Sébastien	DR	IN2P3	Zhu Jianhui	PhD student	CCNU
Rosnet Philippe	PR	IN2P3	Zhang Haitao	PhD student	CCNU
Roy Christelle	DR	IN2P3	Zhang Zuman	Mast. student	CCNU
Schutz Yves	DR	IN2P3	Zhan Yang	Mast. student	CCNU
Shabetai Alexandre	CR	IN2P3	Dang Ruina	Mast. student	CCNU
Silvestre Tello Catherine	CR	IN2P3			
Stocco Diego	CR	IN2P3			
Stutzmann	IE	IN2P3			
Jean Sébastien					
Uras Antonio	Post-doc	IN2P3			

- one project and several activities
- 56 members in 2014
 - ✓ 36 members in 2009
 - ✓ 46 members in 2012
- activities
 - ✓ physics (muons, jets, photons)
 - ✓ computing
 - ✓ offline
 - ✓ detector R&D, construction and operation
 - ✓ upgrade projects
 - ✓ management



FCPPL-ALICE report (2013): activities

Post-docs

- Xiaoming Zhang (CCNU & LPC until beginning of 2013, then at LBNL Berkeley)

Students

• Co-tutorship PhD theses

- ✓ Shuang Li (CCNU) at LPC Clermont-Ferrand (2012-2015)
- ✓ Mengliang Wang (CCNU) at Subatech Nantes (2012-2015)
- ✓ Jianhui Zhu (CCNU) at LPC Clermont-Ferrand for one month and at Subatech Nantes (2013-2016)

• Master II training

- ✓ Zuman Zhang (CCNU) at LPC Clermont-Ferrand for 3 months

Visits

• visit of 9 physicists and 2 co-tutorship PhD students at CCNU-Wuhan (Oct. 2013)

- ✓ Combined ALICE Week and ALICE Physics Week
- ✓ define/discuss works of co-PhD students and Master work of Zuman Zhang
- ✓ discuss further collaboration plans, further involvements to the upgrade projects

6th FCPPL workshop at Nanjing

- 9 physicists in total (5 from IN2P3, 4 from CCNU)

Preparation of 7th FCPPL workshop at UBP/LPC Clermont-Ferrand

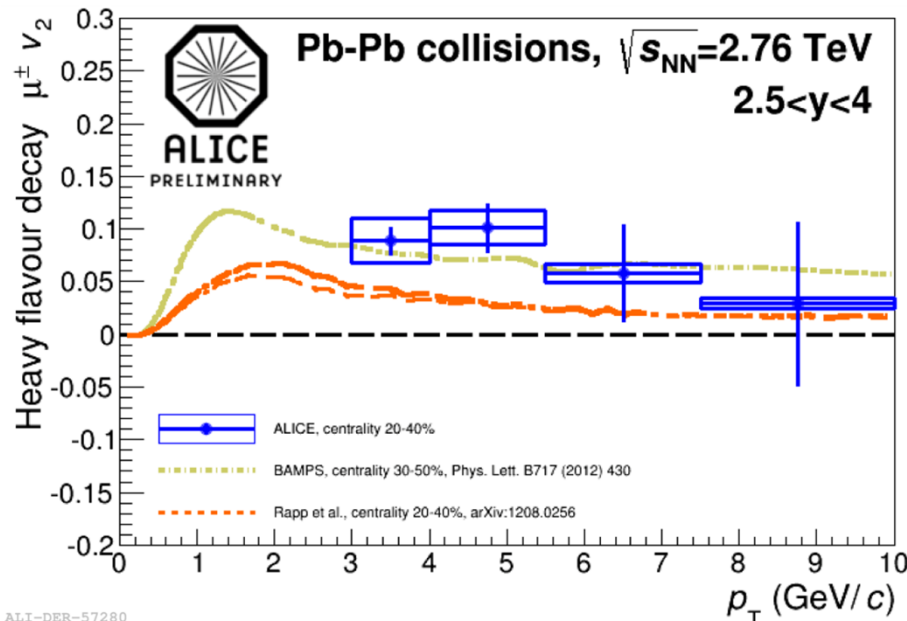


Xiaoming ZHANG

(CCNU-Wuhan & LPC Clermont-Ferrand)

- 2009-2012: co-PhD CCNU-Wuhan & LPC Clermont-Ferrand, funding: french embassy, FCPPL, LPC
- 09-01/2013: CDD-CNRS at LPC Clermont-Ferrand
- 2013-now: post-doctor at LBNL (Berkeley, USA) in ALICE
- topic: measurements of muons from heavy-flavour decays, data analysis and performance study with the Muon spectrometer & MFT

Elliptic flow, v_2 , of muons from heavy-flavour decays

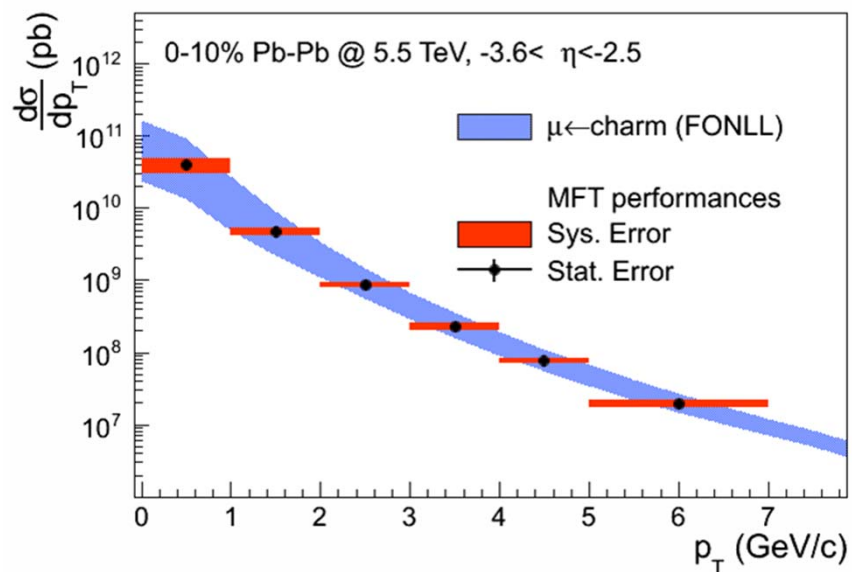
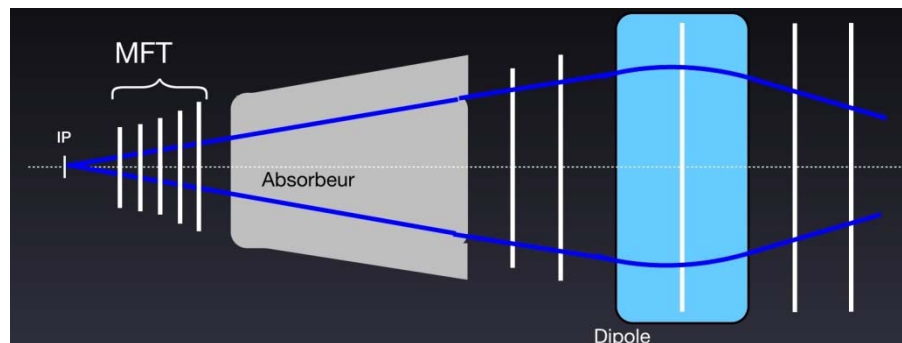


ALI-DEP-57280

- complementary insights on medium properties w.r.t. to R_{AA} (Phys. Rev. Lett. 109 (2012) 112301)
- non-zero v_2 at intermediate p_T in semi-central collisions
- letter in preparation

more: see Xiaoming Zhang talk (April 8th, 11:10)

Xiaoming ZHANG at LPC Clermont-Ferrand



- ☐ Muon Forward Tracker (MFT) will improve the physics reach of the Muon Spectrometer
 - ✓ improvement of pointing accuracy
 - ✓ separation of charm and beauty components down to low p_T
- ☐ published in CERN-LHCC-2013-014
("The Muon Forward Tracker", Addendum to the Letter of Intent "Upgrade of the ALICE Experiment")

more about MFT: see Gines Martinez talk (ALICE/Heavy Ion parallel session)



Shuang Li

(CCNU-Wuhan & LPC Clermont-Ferrand)

- 2012-2015: co-PhD CCNU-Wuhan & LPC Clermont-Ferrand
- topic: production of muons from heavy-flavour decays in p-Pb collisions
- funding: CSC PhD-grant (2 years), Eiffel grant for the 3rd year (10 months)

In process of approval for QM2014 conference

- ☐ initial state effects (final state effects?)
 - ✓ shadowing/gluon saturation
 - ✓ k_T broadening
- ☐ p_T (y)-differential cross-section & nuclear modification factor at forward and backward rapidity, and forward-to-backward ratio in minimum bias collisions to be proposed as preliminary for QM2014 and publication
- ☐ talk at QM2014
(Darmstadt, Germany, May 19-24)

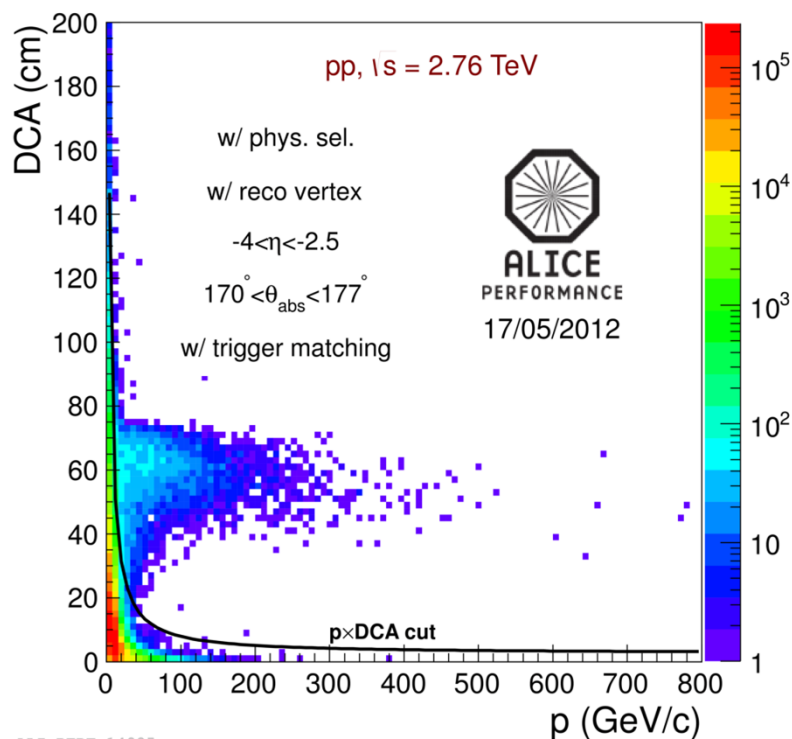
more: see Shuang Li & Zuman Zhang talk (ALICE/Heavy Ion parallel session)



Zuman ZHANG

(CCNU-Wuhan & LPC Clermont-Ferrand)

- 2013-2014: Master II student
- topic: production of muons from heavy-flavour decays in p-Pb collisions
- funding: FCPPL & UBP for a 3 month training at LPC Clermont-Ferrand in 2013
- requested (FCPPL, CCNU, UBP): ~6 months at LPC Clermont-Ferrand



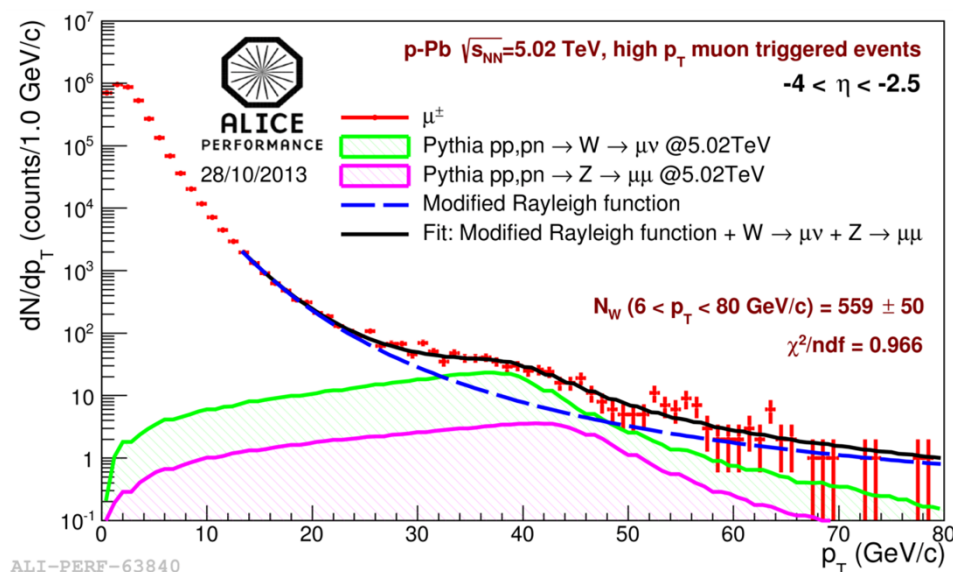
- contribution to the measurement of muons from heavy-flavour decays in p-Pb collisions (in collaboration with Shuang Li)
 - ✓ study of pile-up effect & muon track cuts
 - ✓ production of acceptance x efficiency matrices based on realistic MC simulations
 - ✓ systematic uncertainty on detector response
- next: measurements of muons from heavy-flavour decays as a function of multiplicity

more: see Shuang Li & Zuman Zhang talk (ALICE/Heavy Ion parallel session)

Jianhui ZHU

(CCNU-Wuhan & Subatech-Nantes)

- 2013-2016: co-PhD CCNU-Wuhan & Subatech-Nantes since Nov. 2013 & 1 month at LPC Clermont-Ferrand (Sept. 2013)
- funding: CSC grant (2 years)
- topic: W^\pm -boson production via single muons in pp, p-Pb and Pb-Pb collisions



- ☐ p-Pb collisions: test initial state effects, nuclear PDFs and binary scaling
- ☐ luminosity and detector alignment
- ☐ W^\pm -signal extracted from fits to the muon p_T distribution
- ☐ cross-section in minimum bias collisions and as a function of multiplicity to be proposed as preliminary for QM2014 and paper

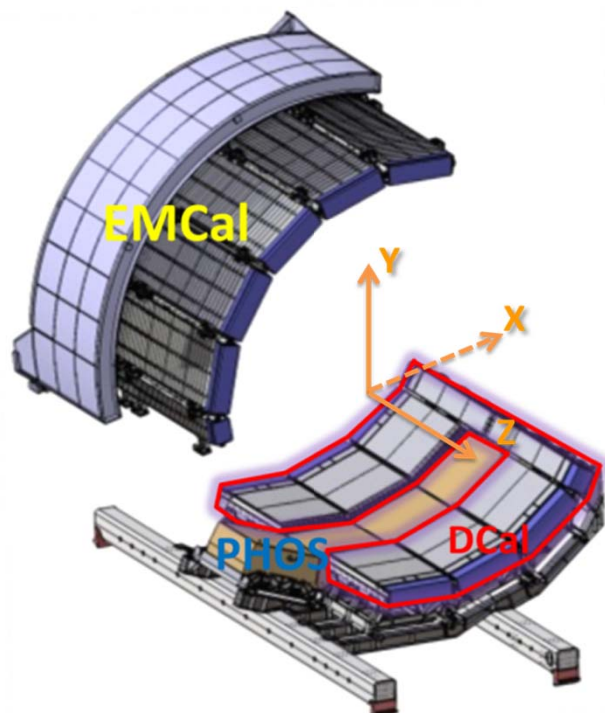
more: see Jianhui Zhu talk (ALICE/Heavy Ion parallel session)



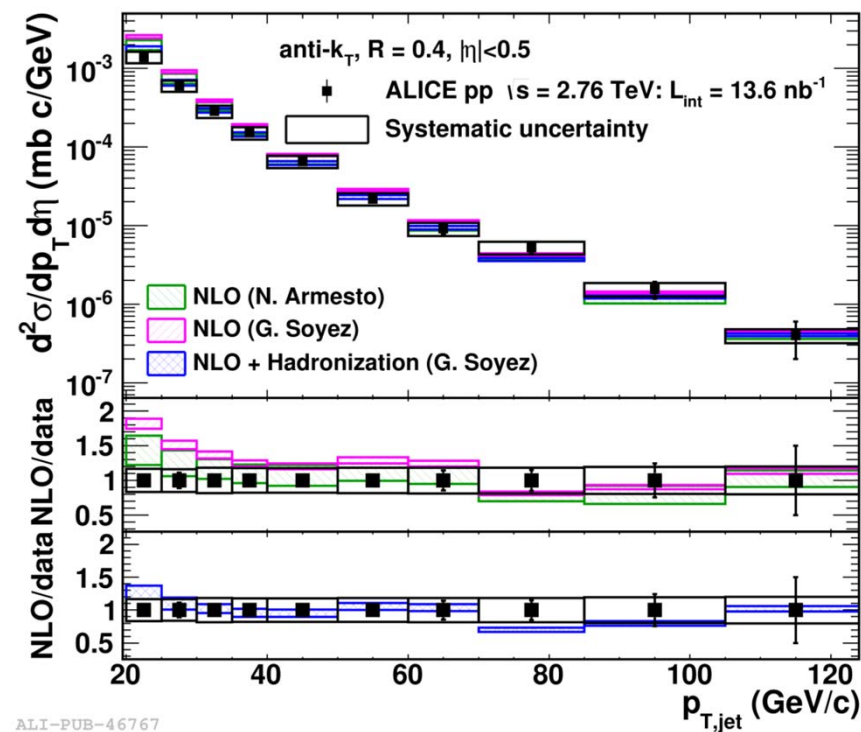
Mengliang WANG

(CCNU-Wuhan & Subatech-Nantes)

- 2012-2015: co-PhD CCNU-Wuhan & Subatech-Nantes
- funding: CSC PhD-grant (3 years)
- topic: measurement of the jet fragmentation function and jet structure in pp, p-Pb and Pb-Pb



- ❑ DCal geometry committed in the official ALICE analysis software
- ❑ data analysis ongoing



ALI-PUB-46767

Phys. Lett. B 722 (2013) 262

more: see Mengliang Wang talk (ALICE/Heavy Ion parallel session) 13



Publications & conferences (students, 2013)

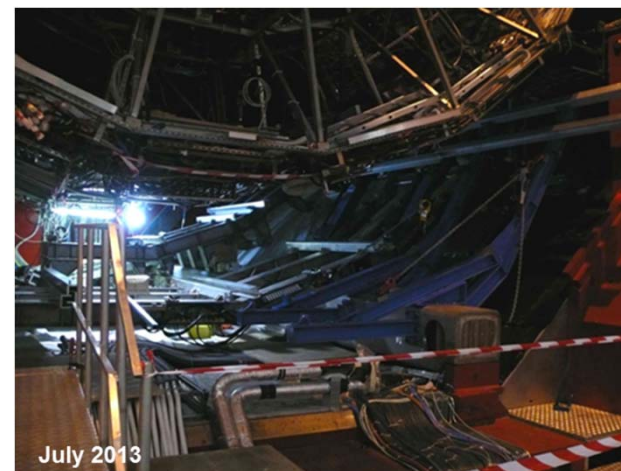
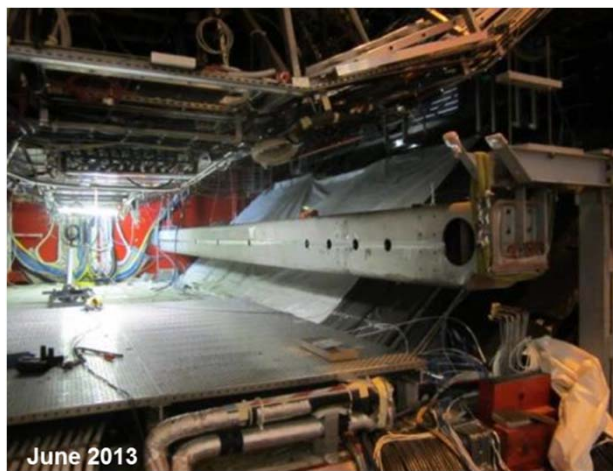
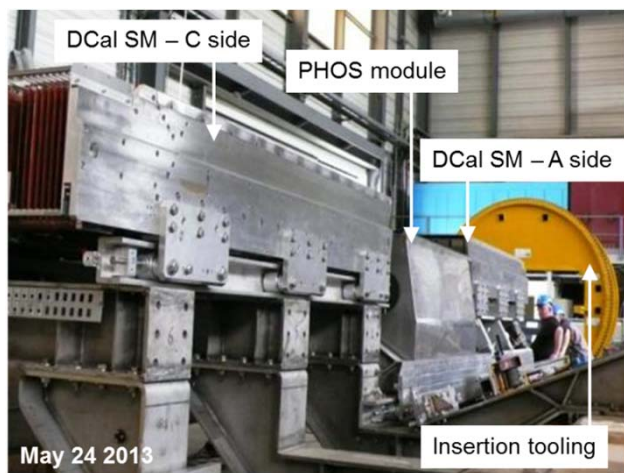
- **Publications with direct contribution & conference proceedings: 4**
 - ✓ Nucl. Phys. A 904-905 (2013) 977c, “Nuclear Modification Factor of Muons from Heavy-flavour Decays and Muon Elliptic flow in Pb-Pb Collisions at $\sqrt{s_{NN}} = 2.76$ TeV”
 - ✓ Journal of Physics: Conference Series, in press, “Nuclear Modification Factor and Elliptic Flow of Muons from Heavy-flavour Decays in Pb-Pb Collisions at $\sqrt{s_{NN}} = 2.76$ TeV”
 - ✓ “Elliptic Flow of muons from heavy-flavour decays in Pb-Pb Collisions at $\sqrt{s_{NN}} = 2.76$ TeV”, in preparation
 - ✓ CERN-LHCC-2013-014, “The Muon Forward Tracker”, Addendum to the Letter of Intent “Upgrade of the ALICE Experiment
- **Talks in international conferences & workshops : 11**
 - ✓ X. Zhang, SQM2013, Birmingham, UK, July 22-27, 2013
 - ✓ X. Zhang, J. Zhu, 6th FCPPL workshop, Nanjing, China, March 27-30, 2013
 - ✓ M. Wang, S. Li, Rencontres QGP-France 2013, Sept. 9-12, 2013
 - ✓ S. Li, International ALICE Muon meeting, Barolo, Italy, May 6-10, 2013
 - ✓ S. Li, X. Zhang, 8th ALICE Physics Week, Padova, Italy, May 19-24, 2013
 - ✓ G. Martinez-Garcia on behalf of S. Li, HP2013, Cape Town, South Africa, Nov. 4-8, 2013
 - ✓ S. Li, M. Wang, J. Zhu, Combined ALICE Week and Physics Week, Wuhan, China, Oct. 10-18, 2013
- **Poster in international conference: 1**
 - ✓ J. Zhu, HP2013, Cape Town, South Africa, Nov. 4-8, 2013
- **many presentations in weekly ALICE Physics Analysis Group meetings and monthly ALICE Physics Working Group meetings**
- **several presentations at QM2014 and several paper proposals to come after QM2014**



The DCal upgrade project (CCNU-Wuhan, Subatech Nantes, LPSC Grenoble)

□ DCal projet (China, France, Italy, Japan, USA)

- back-to-back to EMCal for di-jet & γ/π^0 -jet correlations
- 6 super-modules (SM) & 3 extensions: $\frac{1}{2}$ SM built at Subatech, 1 SM built at CCNU,
- Subatech responsible for inserting tools, support structure & and DCal installation
- production follow-up & production of 24 stripmodules and 48 mini-stripmodules at Subatech in collaboration with CCNU, Italy & Japan groups
- assembly in super-modules & calibrations at LPSC Grenoble
- installation started in 2013 and planed to be finished in 2014 (3 SM and 4 PHOS modules)



more: see Mengliang Wang talk (ALICE/Heavy Ion parallel session)

Prospects in 2014

- ❑ **continue strong involvement in ongoing physics analyses, performance studies & prepare run 2 data analysis**
- ❑ **discuss/prepare further involvements in ALICE upgrade projects**
- ❑ **funding from France: request of 21.7 kEuros in total**
 - stay/travel costs for french physicists for the 7th FCPPL workshop
 - stay costs for senior physicists from CCNU in french institutes
 - stay costs for a student from CCNU at LPSC Grenoble
 - stay cost for a Master student (Z. Zhang) at LPC Clermont-Ferrand
 - travel costs for French physicists/co-PhD students from IN2P3/Irfu at CCNU
- ❑ **funding from China: request of 191,364 Yuan in total**
 - travel costs for physicists from CCNU to attend the 7th FCPPL workshop & visit IN2P3 institutes
 - additional stay costs for physicists from CCNU to visit french institutes
 - travel and stay costs for Z. Zhang (Master student) at LPC Clermont-Ferrand
 - travel costs for a student at LPSC Grenoble
 - stay costs for senior physicists & co-PhD students from IN2P3/Irfu at CCNU
- ❑ **other funding**
 - a demand for a Eiffel PhD grant for S. Li accepted recently (10 months)

Conclusion

**Solid China-France cooperation
on the ALICE scientific program
with a recognized visibility within ALICE**

- ☐ **strong contribution to data taking & data analysis and performance studies**
 - excellent contributions of students,
 - 2014 FCPPL PhD prize
 - large scientific production
- ☐ **technical contribution to DCal**
- ☐ **strengthen the efforts on student and senior physicist exchanges:**
 - a lot of data to analyze soon & new physics topics with the next data taking campaign expected to start in the beginning 2015
 - ongoing discussions concerning a technical participation to the Muon Forward Tracker project



ALICE

Backup



ALICE groups of China and France: a brief history of our collaboration within FCPPL (I)

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