

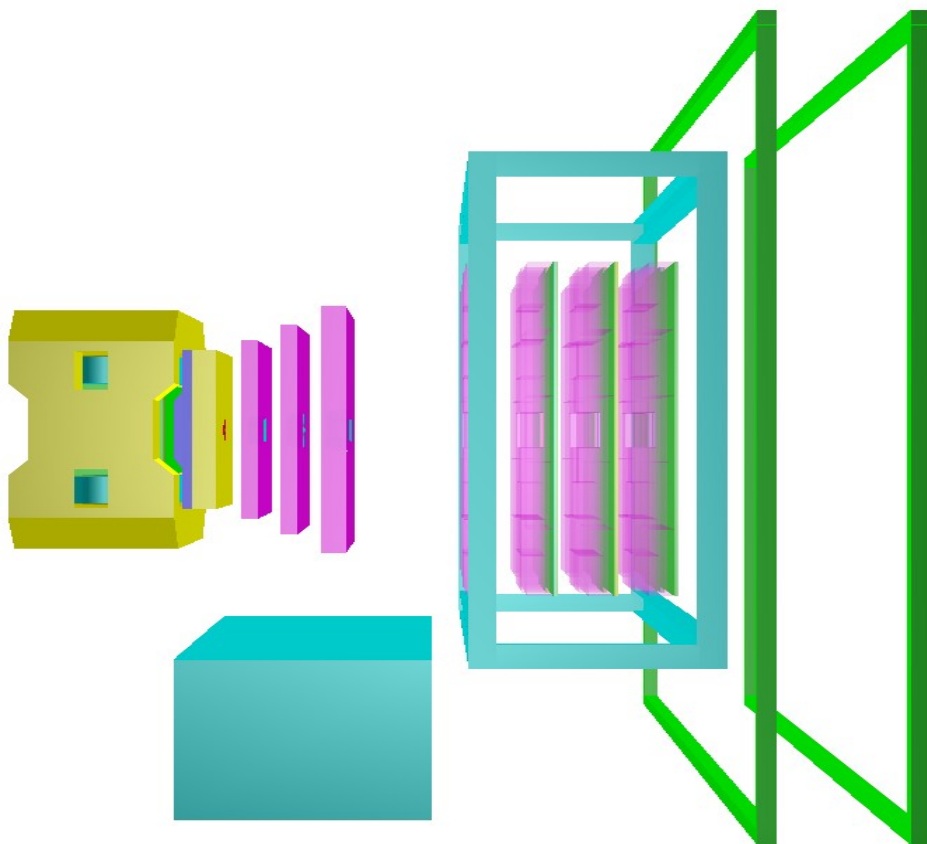
Performance Study in case of realistic MuCh Digitization

CBM PWG Di-Lepton Meeting

**Presented by: Abhishek Kumar Sharma
(AMU, Aligarh-India)**

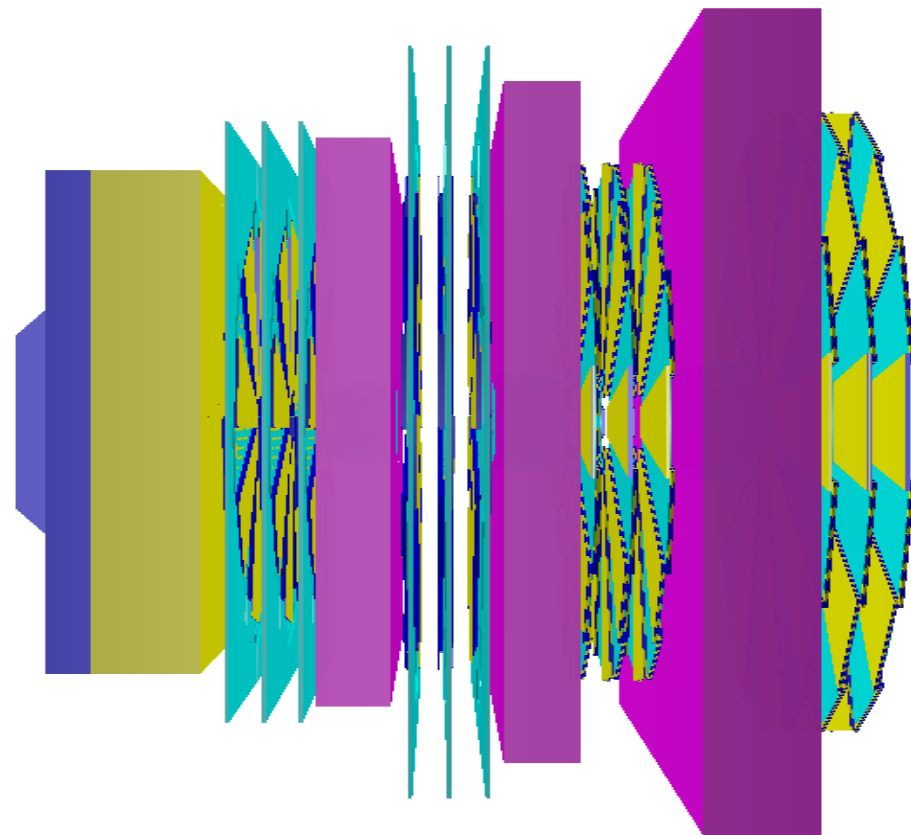


CBM Detector Setup



SIS_100_muon_lmvm

Muon Chamber Detector



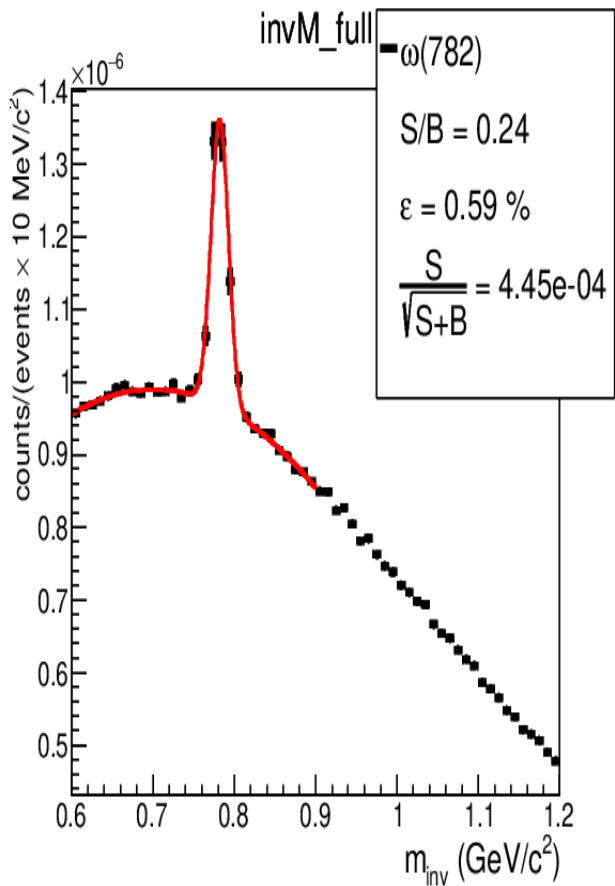
Much_v23a

Digitization parameter

Realistic Digitization Parameter			Previous Digitization Parameter		
	GEM	RPC		GEM	RPC
Q_{\max}	80fc	250fc	Q_{\max}	80fc	130fc
$Q_{\text{Threshold}}$	6fc	15fc	$Q_{\text{Threshold}}$	2fc	30fc
Spot Radius	500 μm	1.25cm	Spot Radius	500 μm	2mm
Mean Gas Gain	5000	30000	Mean Gas Gain	5000	30000

Invariant Mass using previous digitization parameters

Invariant Mass using 6fC Charge Threshold for GEM and other digitization parameters same as previous



Cuts:

N of STS hits ≥ 7

N of MUCH hits ≥ 11

N of TRD hits ≥ 1

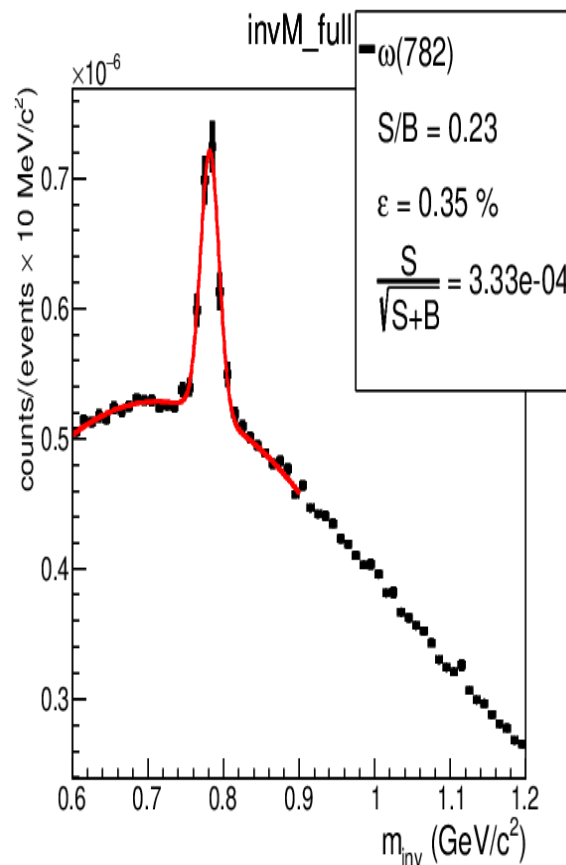
N of TOF hits ≥ 1

$\chi^2_{\text{vertex}} \leq 2.5$

$\chi^2_{\text{STS}} \leq 2.0$

$\chi^2_{\text{MUCH}} \leq 3.0$

2σ cut in TOF



Cuts:

N of STS hits ≥ 7

N of MUCH hits ≥ 11

N of TRD hits ≥ 1

N of TOF hits ≥ 1

$\chi^2_{\text{vertex}} \leq 2.5$

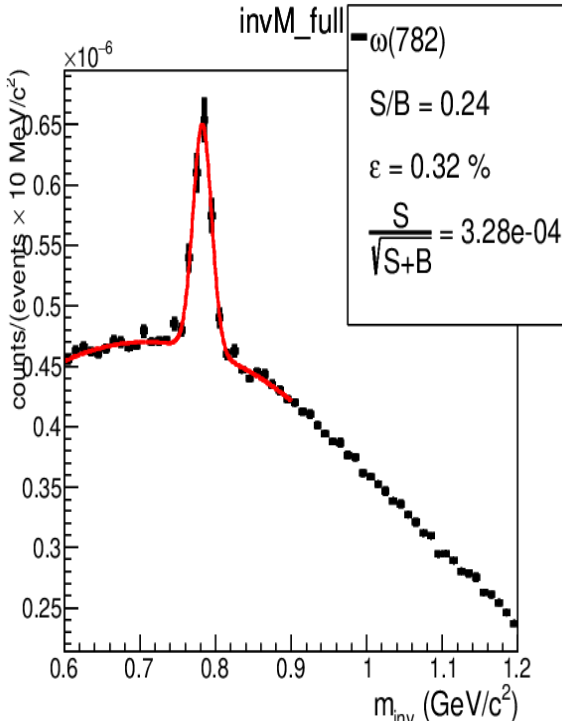
$\chi^2_{\text{STS}} \leq 2.0$

$\chi^2_{\text{MUCH}} \leq 3.0$

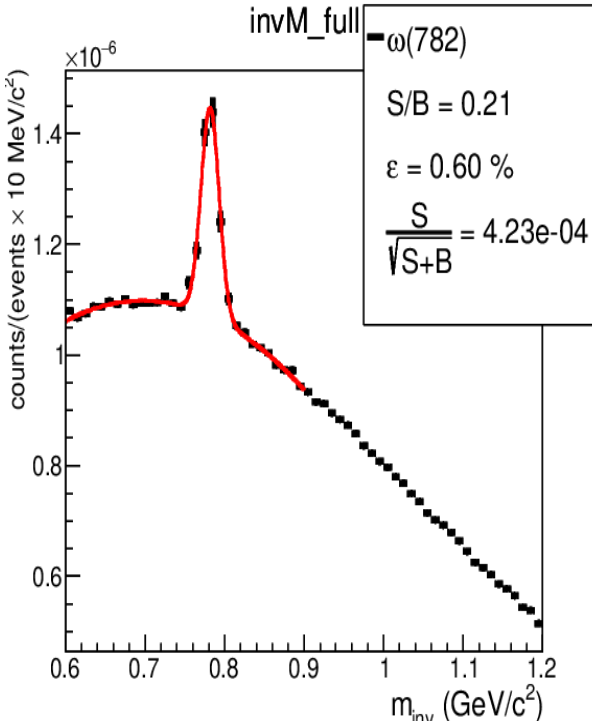
2σ cut in TOF

Invariant Mass using 1.25cm Spot Radius for RPC and other digitization parameters same as previous

Invariant Mass using 250fC Maximum Charge Threshold for RPC and other digitization parameters same as previous



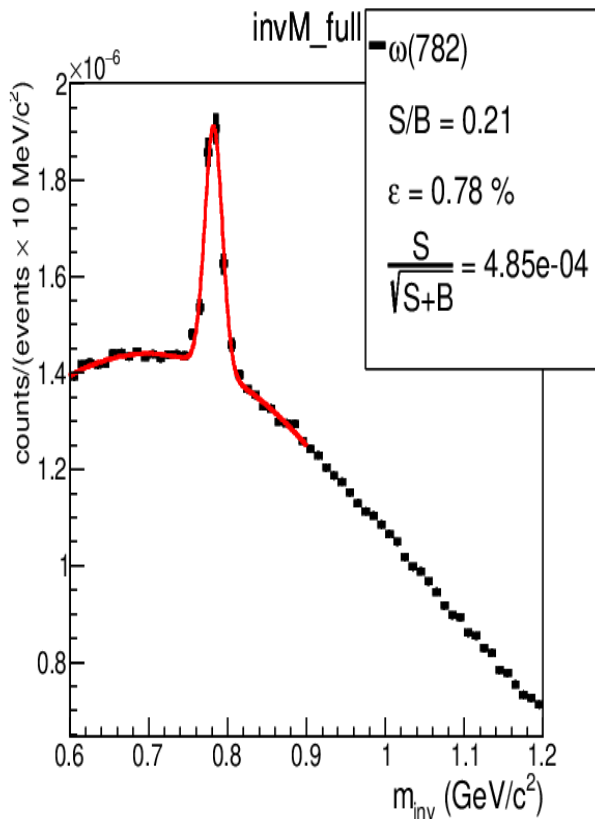
- Cuts:**
- N of STS hits ≥ 7
 - N of MUCH hits ≥ 11
 - N of TRD hits ≥ 1
 - N of TOF hits ≥ 1
 - $\chi^2_{\text{vertex}} \leq 2.5$
 - $\chi^2_{\text{STS}} \leq 2.0$
 - $\chi^2_{\text{MUCH}} \leq 3.0$
 - 2σ cut in TOF



- Cuts:**
- N of STS hits ≥ 7
 - N of MUCH hits ≥ 11
 - N of TRD hits ≥ 1
 - N of TOF hits ≥ 1
 - $\chi^2_{\text{vertex}} \leq 2.5$
 - $\chi^2_{\text{STS}} \leq 2.0$
 - $\chi^2_{\text{MUCH}} \leq 3.0$
 - 2σ cut in TOF

Invariant Mass using 15fC Charge Threshold for RPC and other digitization parameters same as previous

Invariant Mass using realistic parameters



Cuts:

N of STS hits ≥ 7

N of MUCH hits ≥ 11

N of TRD hits ≥ 1

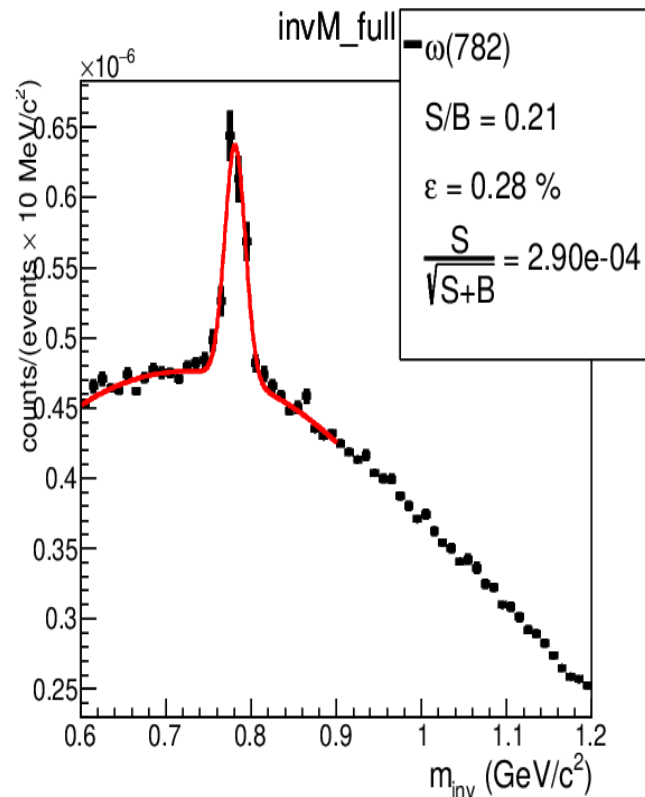
N of TOF hits ≥ 1

$\chi^2_{\text{vertex}} \leq 2.5$

$\chi^2_{\text{STS}} \leq 2.0$

$\chi^2_{\text{MUCH}} \leq 3.0$

2σ cut in TOF



Cuts:

N of STS hits ≥ 7

N of MUCH hits ≥ 11

N of TRD hits ≥ 1

N of TOF hits ≥ 1

$\chi^2_{\text{vertex}} \leq 2.5$

$\chi^2_{\text{STS}} \leq 2.0$

$\chi^2_{\text{MUCH}} \leq 3.0$

2σ cut in TOF

	Efficiency(%)	Signal / Background	Significance	% Change Significance
Invariant Mass using previous digitization parameters	0.59	0.24	4.45e-04	0%
6fC Charge Threshold for GEM and other digitization parameters same as previous	0.35	0.23	3.33e-04	-25.1%
1.25cm Spot Radius for RPC and other digitization parameters same as previous	0.32	0.24	3.28e-04	-26.2%
250fC Maximum Charge Threshold for RPC and other digitization parameters same as previous	0.60	0.21	4.23e-04	-4.9%
15fC Charge Threshold for RPC and other digitization parameters same as previous	0.78	0.21	4.85e-04	8.9%
Invariant Mass using all new parameters	0.28	0.21	2.90e-04	-34.83%

Thank You.....