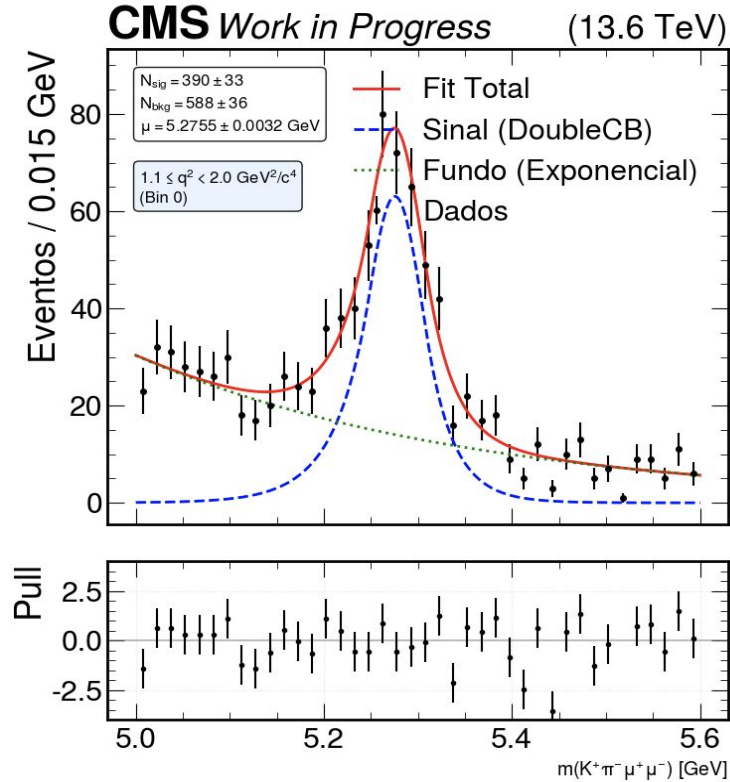
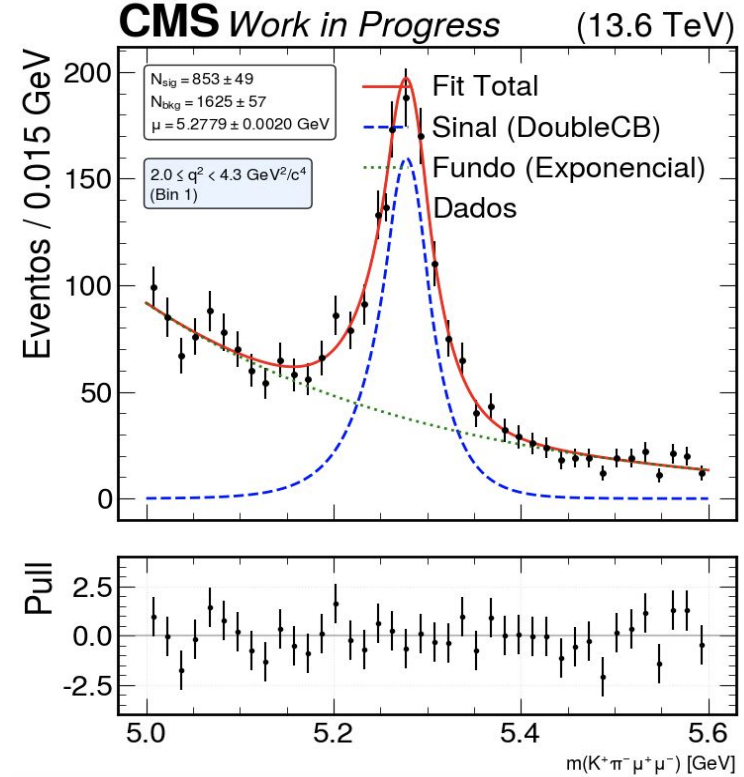


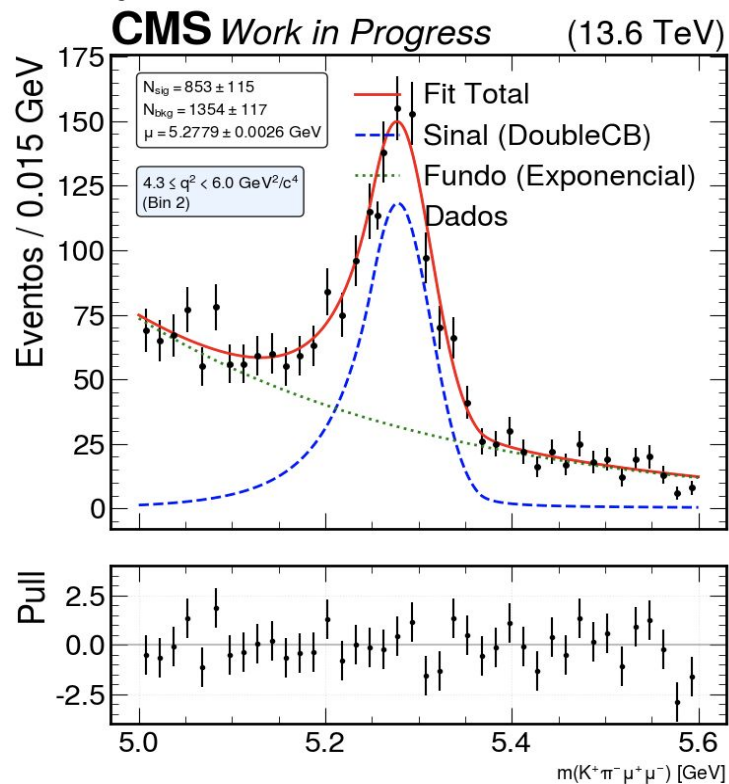
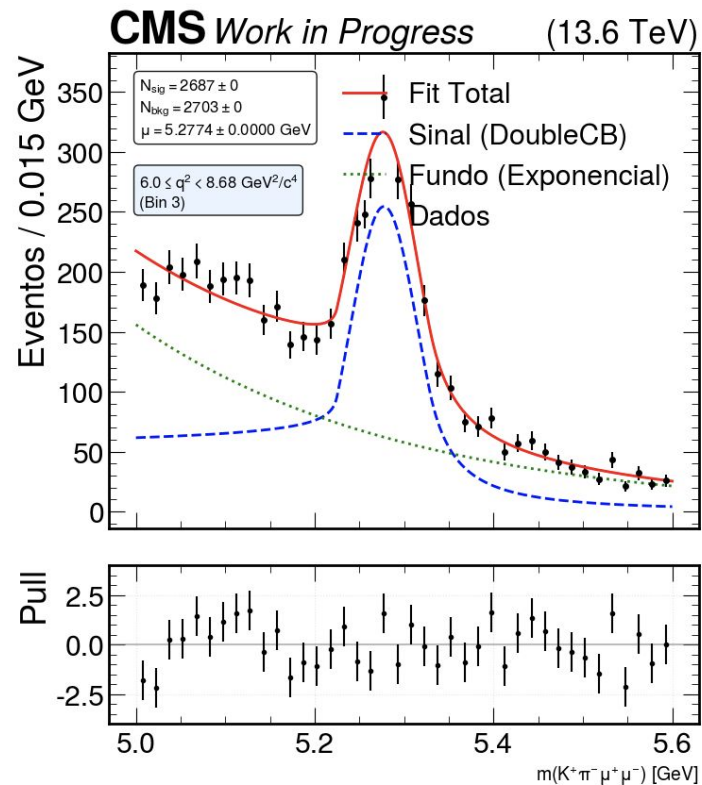


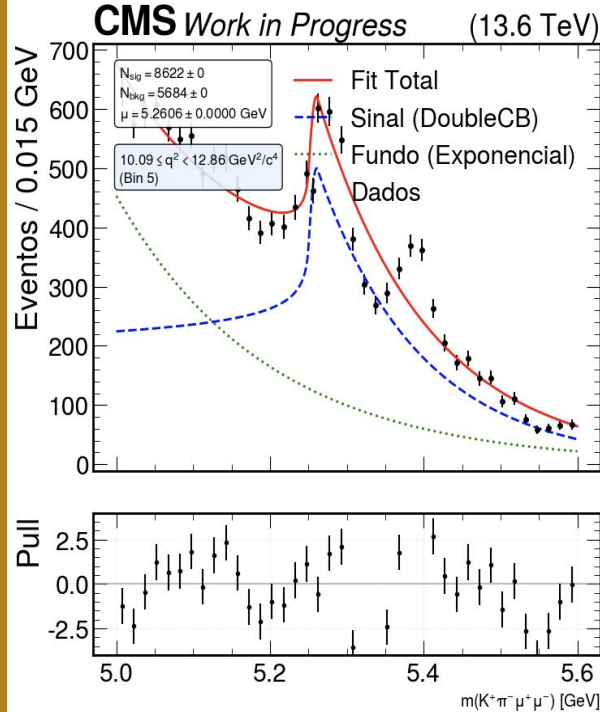
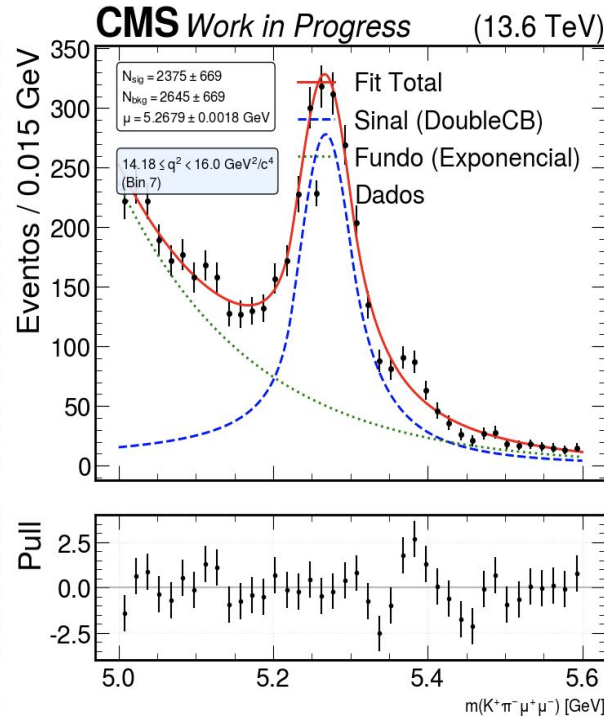
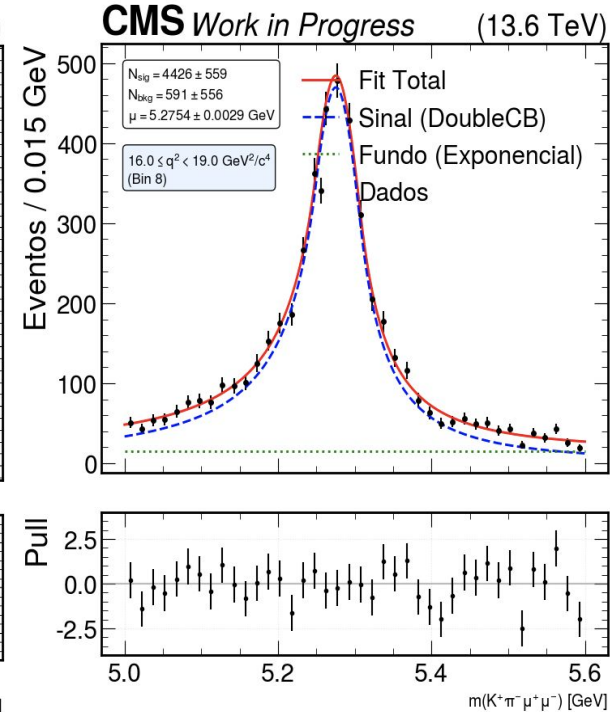
Flavour Anomalies: Angular Analysis of $B^0 \rightarrow K^{*0} (892) \mu^+ \mu^-$ Decay Channel Bi-weekly Meeting

Student: Thiago de Andrade Rangel Monteiro

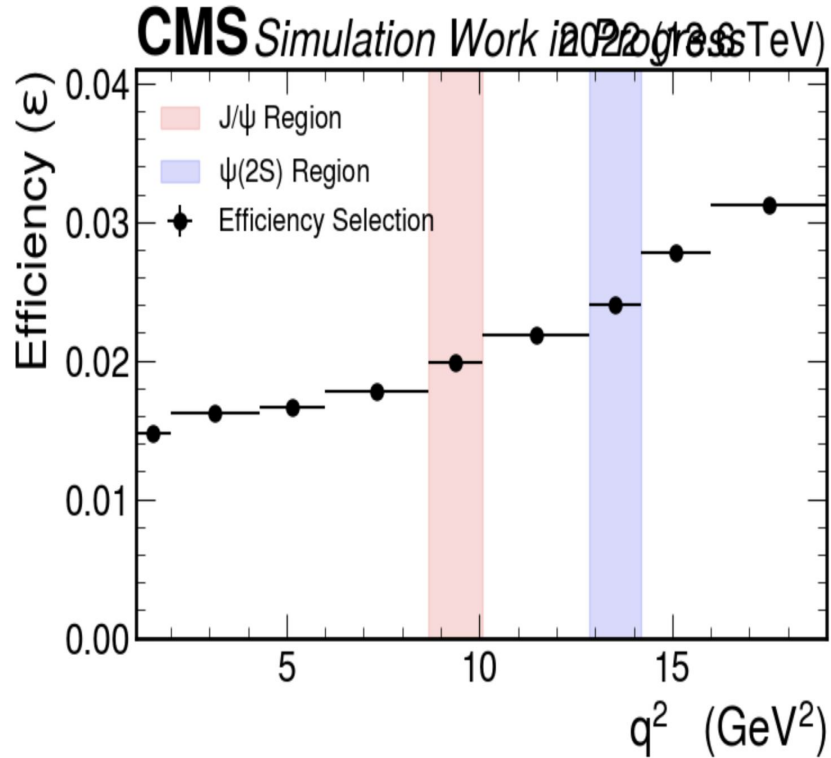
21 de março de 2025







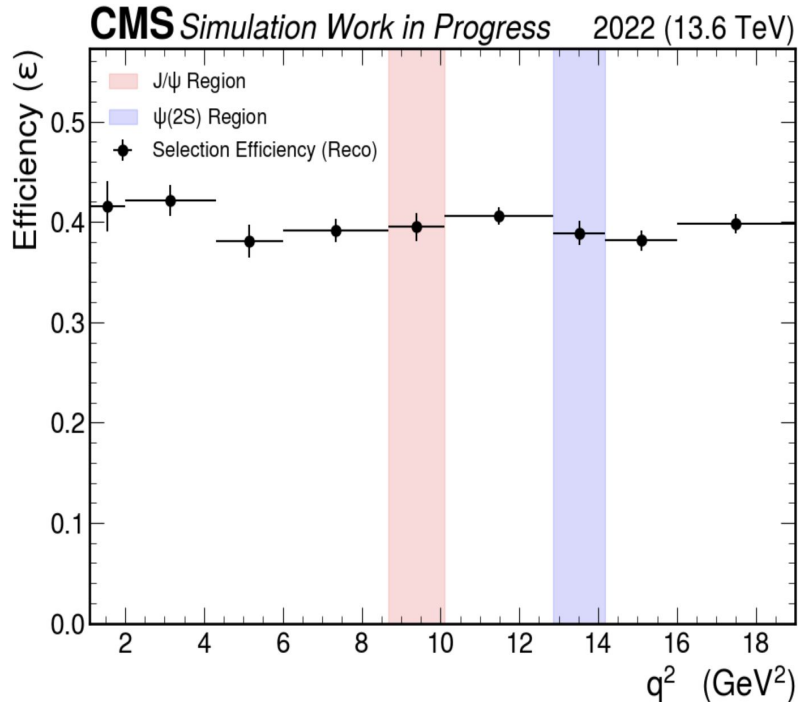
Branching Fraction - Acceptance



```
pass_muon = (abs(pdg) == 13) & (pt > 3.5) & (eta_abs < 2.5)
pass_kaon = (abs(pdg) == 321) & (pt > 0.5) & (eta_abs < 2.5)
pass_pion = (abs(pdg) == 211) & (pt > 0.5) & (eta_abs < 2.5)
```

Range q^2 (GeV^2)	Total $B0$	Passed	Eff (%)	Erro (%)
1.10 - 2.00	91880	1352	1.47	0.04
2.00 - 4.30	201131	3265	1.62	0.03
4.30 - 6.00	160717	2665	1.66	0.03
6.00 - 8.68	306856	5458	1.78	0.02
8.68 - 10.09	178217	3546	1.99	0.03
10.09 - 12.86	368593	8058	2.19	0.02
12.86 - 14.18	173760	4182	2.41	0.04
14.18 - 16.00	217863	6043	2.77	0.04
16.00 - 19.00	223075	6956	3.12	0.04

Branching Fraction - Reconstruction



```
kstar_pdg = 0.892
```

```
dist_kpi = abs(df['BToTrkTrkMuMu_fit_ditrack_mass_Kpi'] - kstar_pdg)
```

```
dist_pik = abs(df['BToTrkTrkMuMu_fit_ditrack_mass_piK'] - kstar_pdg)
```

```
is_kpi_closer = dist_kpi < dist_pik
```

```
best_ditrack_mass = dak.where(is_kpi_closer, df['BToTrkTrkMuMu_fit_ditrack_mass_Kpi'], df['BToTrkTrkMuMu_fit_ditrack_mass_piK'])
```

```
mask_kstar_window = abs(best_ditrack_mass - kstar_pdg) <= 0.150
```

```
mask = (
    mask_kstar_window &
    (df['HLT_DoubleMu4_3_LowMass'] == 1) &
    (df['BToTrkTrkMuMu_fit_l1_pt'] > 4.0) &
    (df['BToTrkTrkMuMu_fit_l2_pt'] > 4.0) &
    (abs(df['BToTrkTrkMuMu_fit_l1_eta']) < 2.4) &
    (abs(df['BToTrkTrkMuMu_fit_l2_eta']) < 2.4) &
    (df['BToTrkTrkMuMu_fit_trk1_pt'] > 1.0) &
    (df['BToTrkTrkMuMu_fit_trk2_pt'] > 1.0) &
    (df['BToTrkTrkMuMu_fit_cos2D'] > 0.99)
)
```

```
return mask
```

Range q^2 (GeV^2)	Total B0 (Reco)	Passed Sel	Eff (%)	Erro (%)
1.10 - 2.00	392	163	41.58	2.49
2.00 - 4.30	1033	435	42.11	1.54
4.30 - 6.00	892	340	38.12	1.63
6.00 - 8.68	1878	735	39.14	1.13
8.68 - 10.09	1263	499	39.51	1.38
10.09 - 12.86	3058	1242	40.61	0.89
12.86 - 14.18	1631	634	38.87	1.21
14.18 - 16.00	2202	840	38.15	1.04
16.00 - 19.00	2546	1014	39.83	0.97

Branching Fraction - Result

