Current Status

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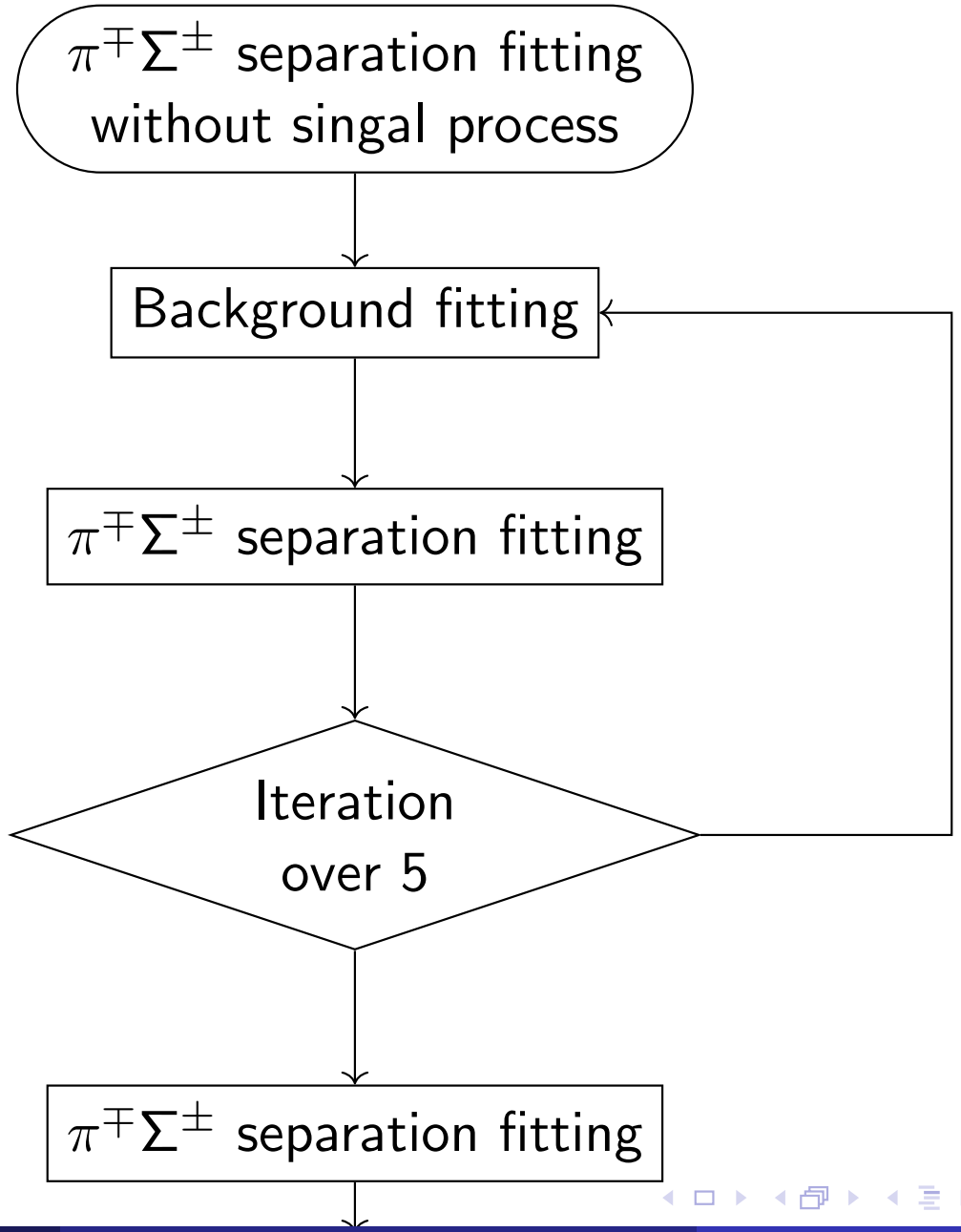
$\pi^{\pm}\Sigma^{\pm}$ Separation



$K^-(d, n)\pi\Sigma$ Reaction

Spectra

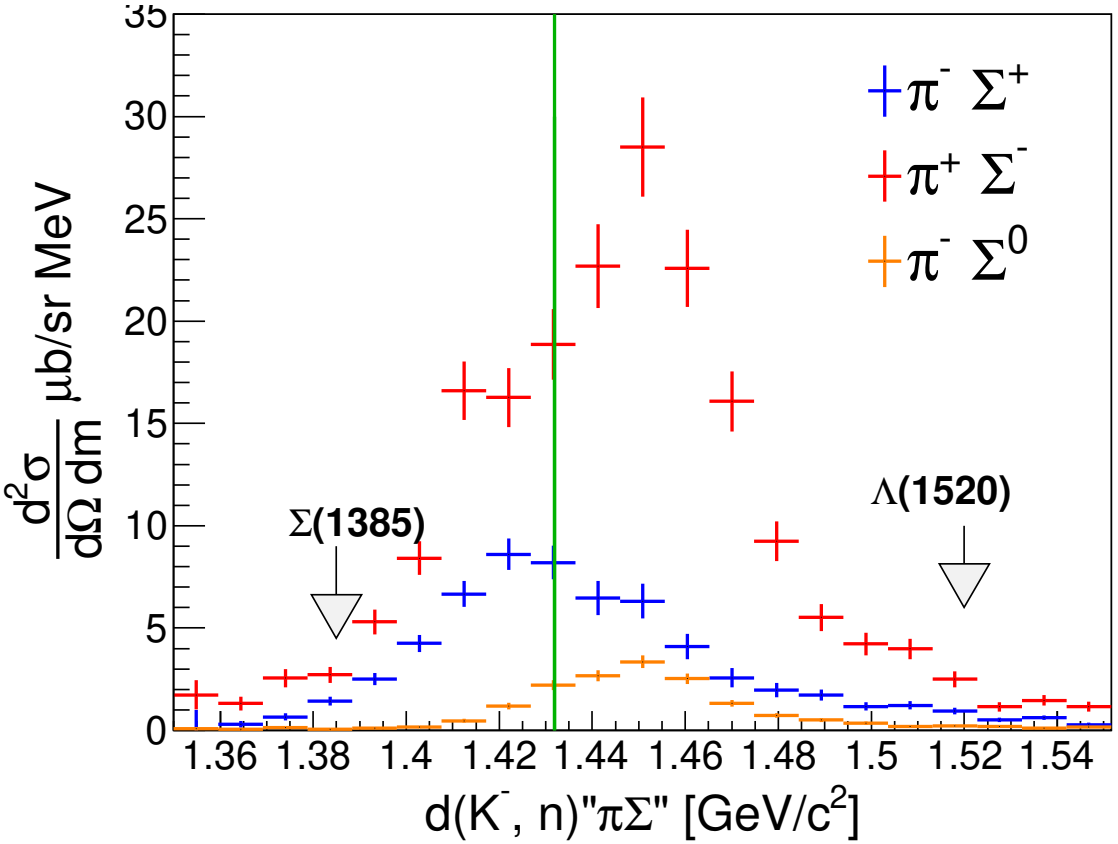

$\frac{d^2\sigma}{d\Omega\, dm}$ μb/sr MeV
$\pi^-\ \Sigma^+$
$\pi^+\ \Sigma^-$
$\pi^-\ \Sigma^0$
Σ(1385)
Λ(1520)
d(K⁻, n)"πΣ" [GeV/c²]

Table of Content

Discovery of the $\Lambda(1405)$

$\Lambda(1405)$(PDG)

$S = -1, J^P = (\frac{1}{2})^-$

$m = 1405.1^{+1.3}_{-1.0} MeV/c$

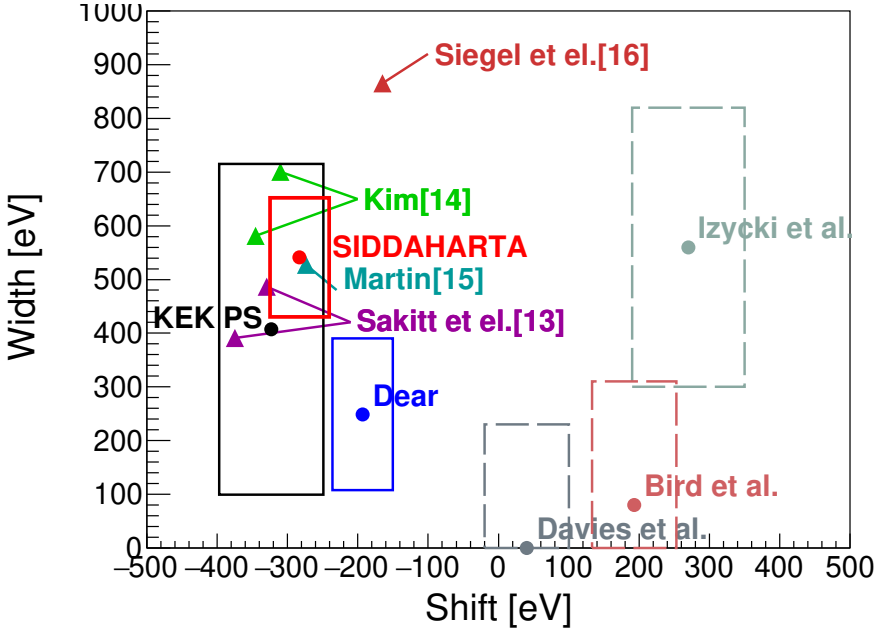
$\Gamma = 50.5 \pm 2.0 MeV/c$

1959 R. H. Dalitz and F. taun was predicted.

1961 The candidate was discoveried in $K^- p \to \pi\pi\pi\Sigma$ at the LRL.
There are ambiguity of π.

1985 The high statics data was reported with 4.2 GeV/c K^- beam by R. J. Hemingway.
$\Rightarrow \pi^+\Sigma^-$ spectrum was used first analysis by the R. H. Dalitz.

$\bar{K}N$ interaction (Kaonic hydrogen puzzle)



Deser-Trueman formula

$$\Delta E_1^s - \frac{i}{2}\Gamma_1 = -2\alpha^3 \mu_c^2 a_{K^- p}$$

1960's-1980's

1980 M. Izycki et al.,
Z. Phys. A 297, 11

1979 J. D. Davies et al.,
Phys. Lett. B **83**, 55

1983 P. M. Bird et al.,
Nucl. Phys. A **404**, 482

Improve by usage of gasses target

1997 M. Iwasaki et el., Phys. Rev. Lett. **78**, 3067 **KEK PS**

2005 G. Beer et el., Phys. Rev. Lett. **94**, 212302 **Dear**

2011 M. Bazzi et el., Phys. Lett. B **704**, 113 **SHIDDARTA**

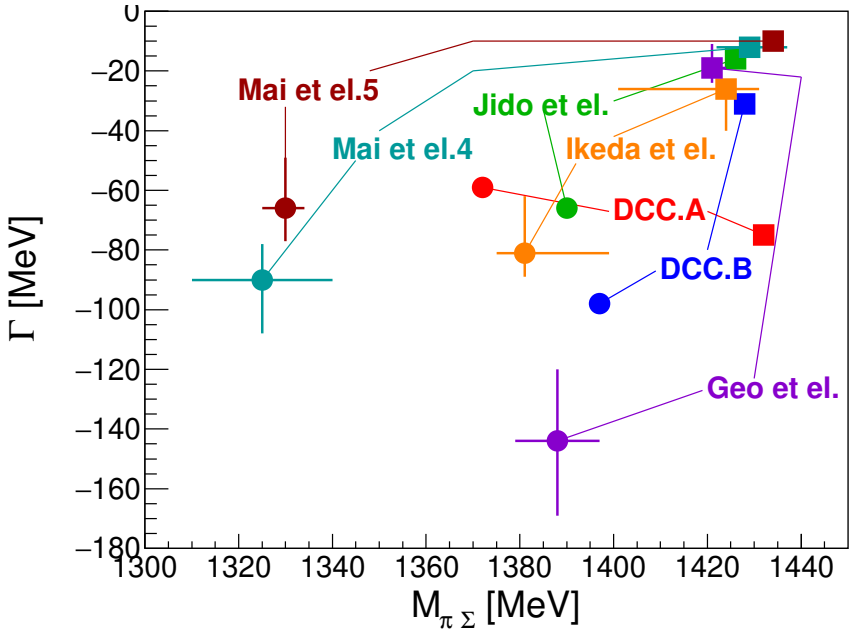
$\Rightarrow$ Using as $\bar{K}N$ Constraint

Recent theoritial status

D. Jido et el. suggested tow pole state, $\bar{K}N$(higher) and $\pi\Sigma$(lower).

Nucl. Phys. A 725, 181 (2003).

$\Rightarrow$ Similar method and result were come out.



NLO w/ Constraint by SHIDDARTA.

Y. Ikeda, et el.,

Nucl. Phys. A **881**, 98 (2012)

Z.-H. Guo and J. Oller,

Phys. Rev. C **87**, 3, 035202 (2013)

Filltering by CLAS data

M. Mai and U.-G. Meiβner

Eur. Phys. J. A **51**, 3, 30

DCC method

H. Kamano et el.

Phys. Rev. C**92**, 025205 (2015)

$d(K^-, n)$ reaction and J-PARC E31