J-PARCハドロン物理の将来計画を考える研究会（実験サイドから）

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P11	K.Nishikawa	KEK
P13	T.Tamura	Tohoku U.
P14	T.Yamanaka	Osaka University
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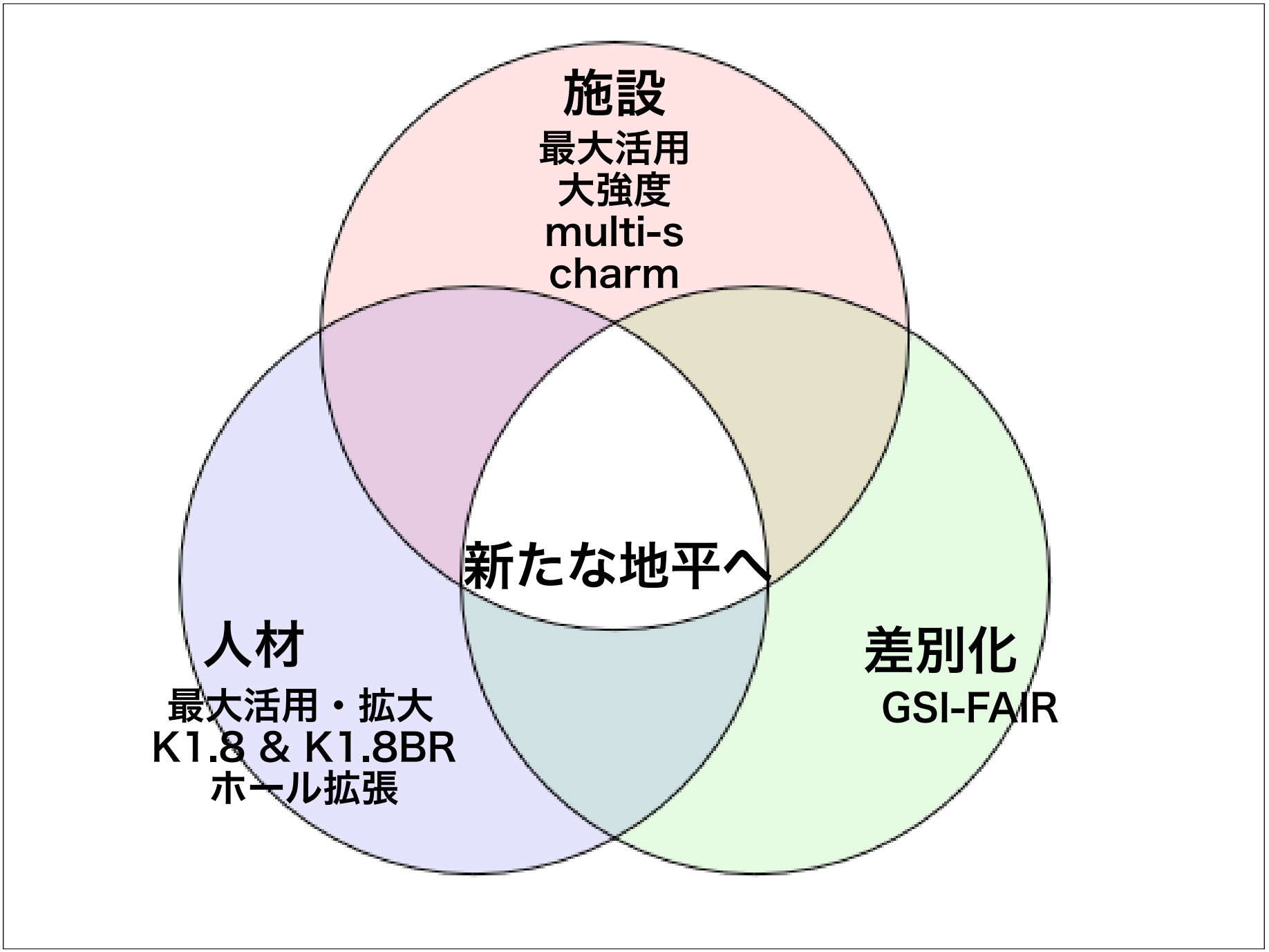
P19	M.Naruki	RIKEN
P21	Y.Kuno	Osaka U
P22	S. Ajimura, A.Sakaguchi	Osaka U
P23	A.D.Krisch	U. Michigan
P24	Y. Goto, H. Sato	RIKEN, KEK

多くのハドロン実験

全部では無い

それを越えて？

田村


施設
最大活用
大強度
multi-s
charm
新たな地平へ
人材
最大活用・拡大
K1.8 & K1.8BR
ホール拡張
差別化
GSI-FAIR

Quantum Chromo Dynamics

Perturbative region → Non-Perturbative region

Current quark

Chiral symetry is a good symmetry

Parton model

↓

Precise determination of spin structure functions: GPD

Color confinement

Spontaneous breakdown of chiral symmetry

Generation of Hadron mass

Creation of NG bosons: π, K, η

Consituent quark

Flavor SU(3) symmetry is a good symmetry

Quark model

↓

Multi quark hadron physics: pentaquark, tetraquark, meson-baryon resonances

key point?

大型汎用スペクトロメータ：閉じ込め

高分解能：大強度の利用

vs. 人材・アイデアの空洞化

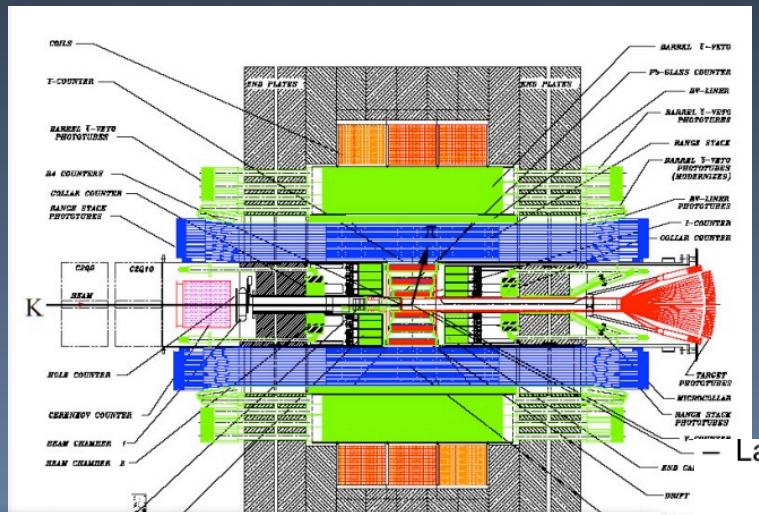
ホール拡張：K1.8 & K1.1 小回りの利く研究・人材育成

共存：　人材育成・多くの研究output・運営費

新しいアイデア：

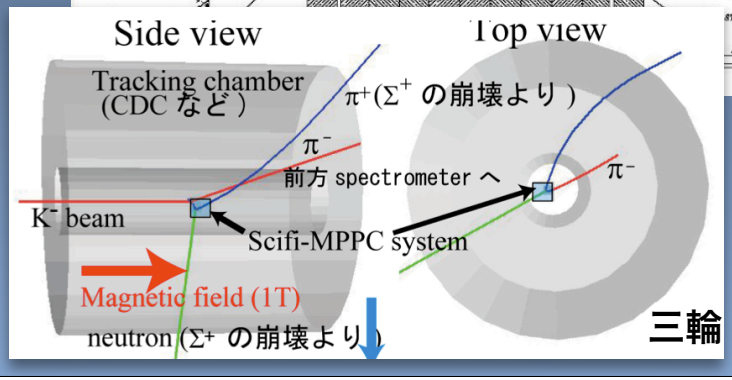
THE DETECTOR

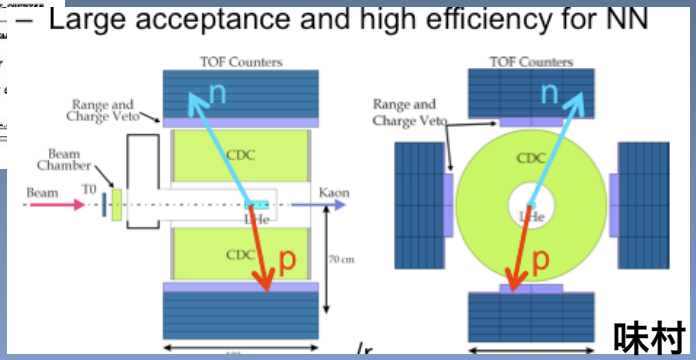
- 4π coverage for both charged and neutral particles
- Vertex reconstruction for short lived particles
- Good K/π separation
- High momentum resolution in the forward angles



- K, K, π, p, p, etc.

E949, CLEO, BaBar, Belle,,,
+ forward spectrometer





高分解能：大強度の利用
分散整合ライン・s=1の物理

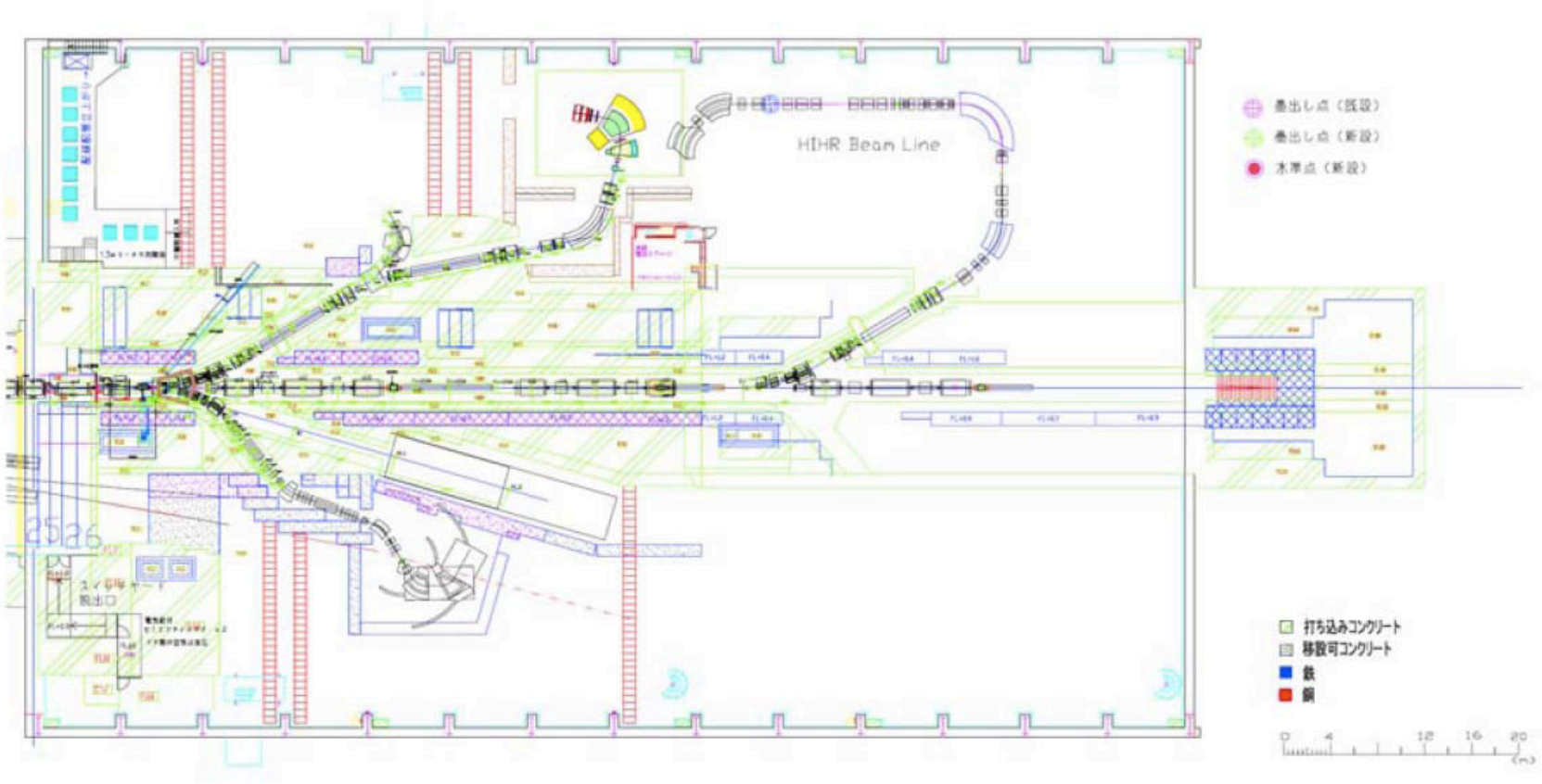


Fig. 1: An example of layout plan of High Intensity, High Resolution (HIHR) Beam Line connected to the T2 target in the extended Hadron Experimental Hall.

AGS Beam Lines in 1984

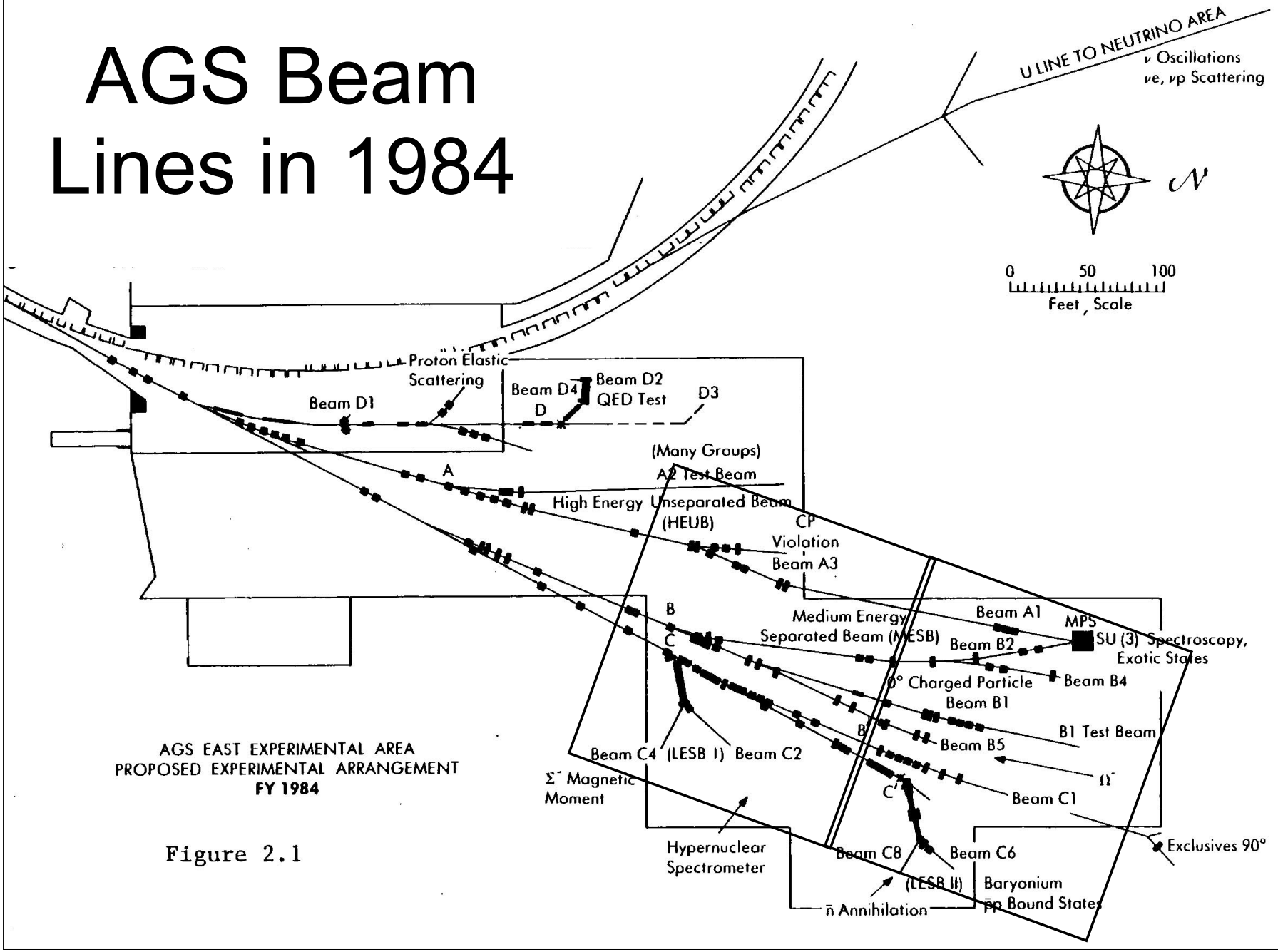
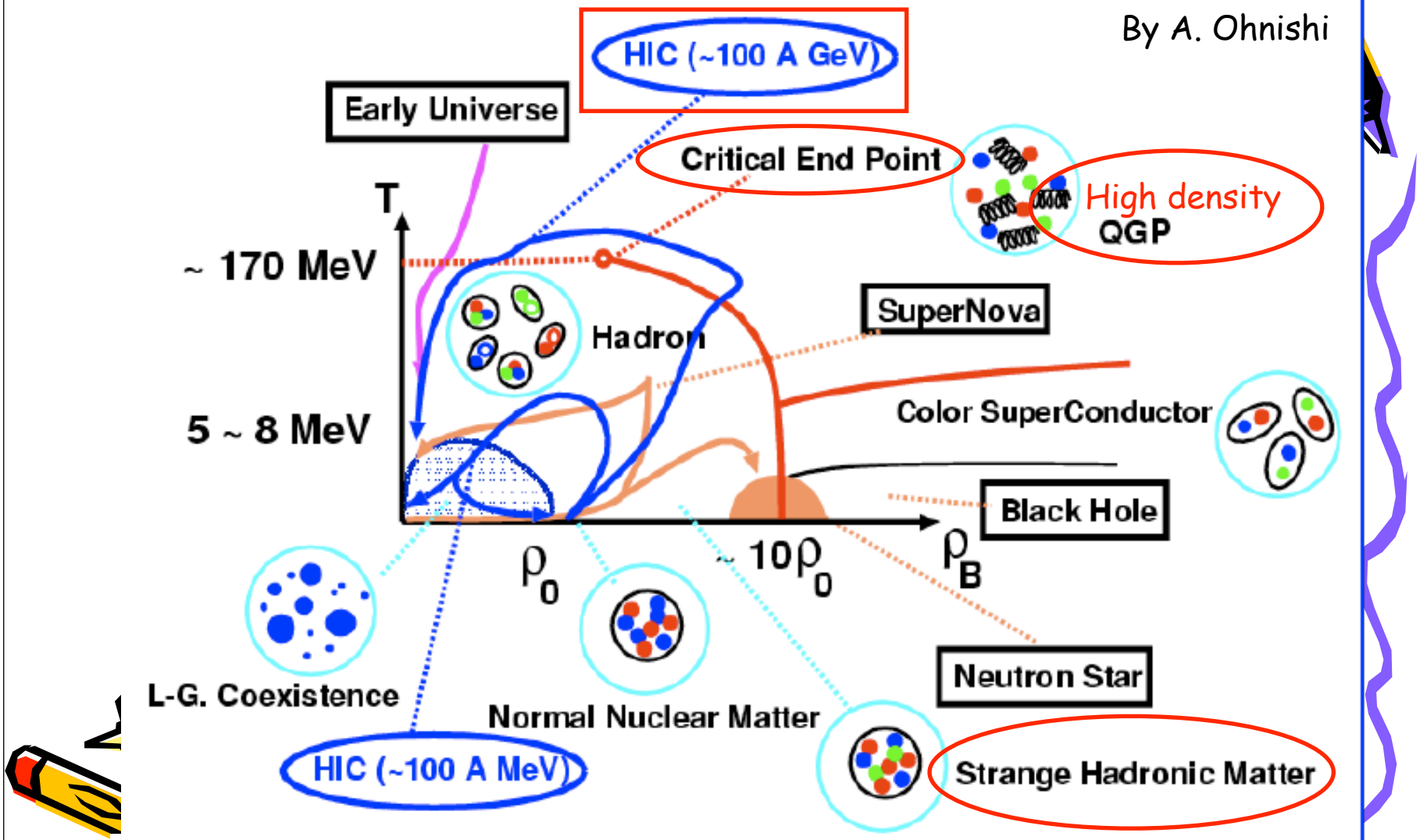


Figure 2.1

Explore QCD phase

By A. Ohnishi

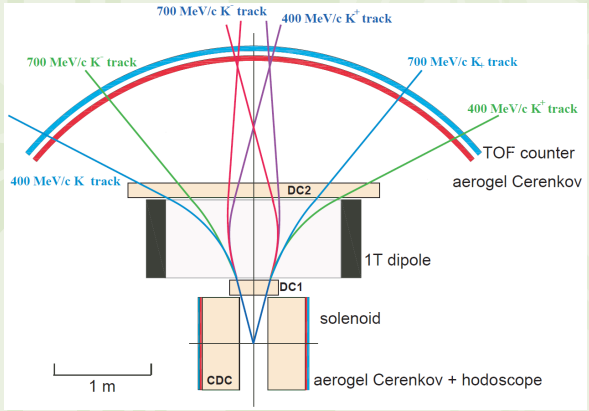


In addition, hadron properties can be measured in several QCD media.

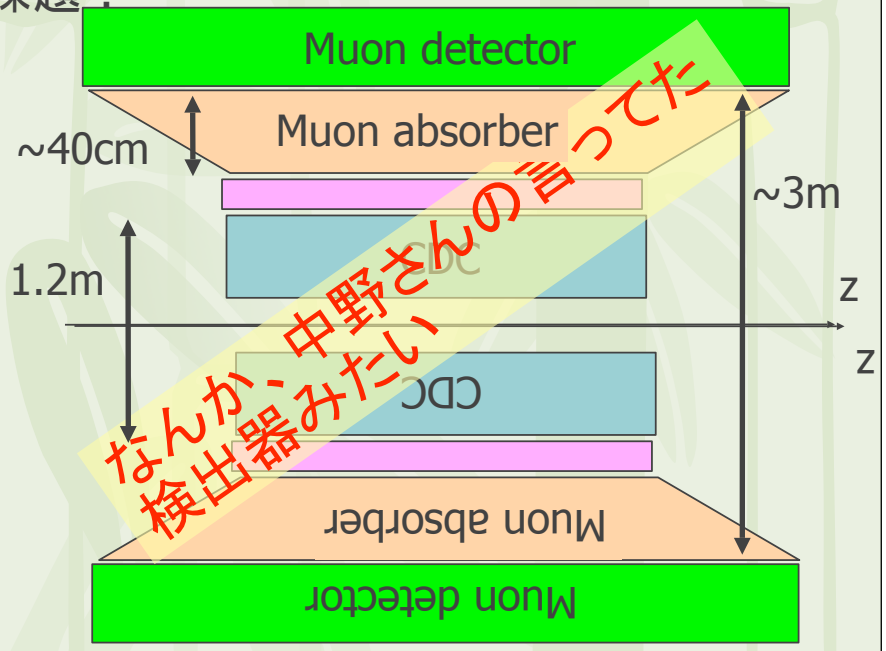
φ meson physics at J-PARC

- K中間子原子核探索実験　　J－PARC　E15 (on going!)
  anti-K N の相互作用の明確な答えを出す
- 原子核中で生成された　φ->ee 測定　　J－PARC　E16（on going!）

- φ 中間子原子核生成　探索実験　　J－PARC　LoI
- 原子核中で生成された　φ->μμ 測定　　アイディアのみ（出来たらいいな）
- 必要なものは？　どうやって？　今後の課題？
- さて、　φ 中間子原子核探索実験と
  φ->μμ 測定同時に出来ない？



標的周りを

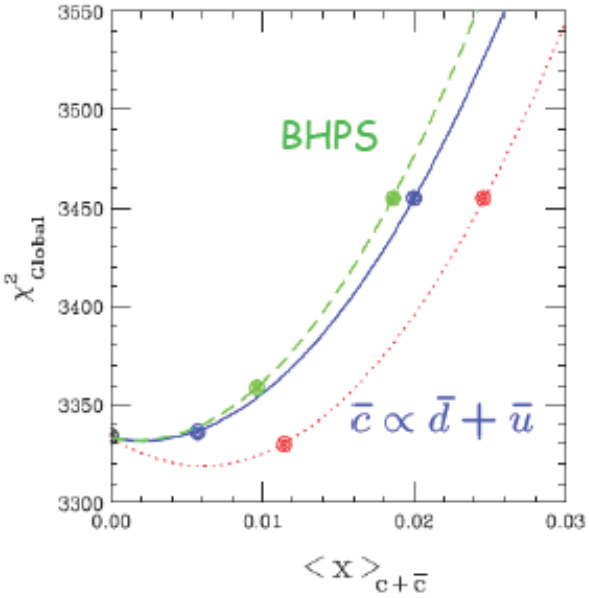


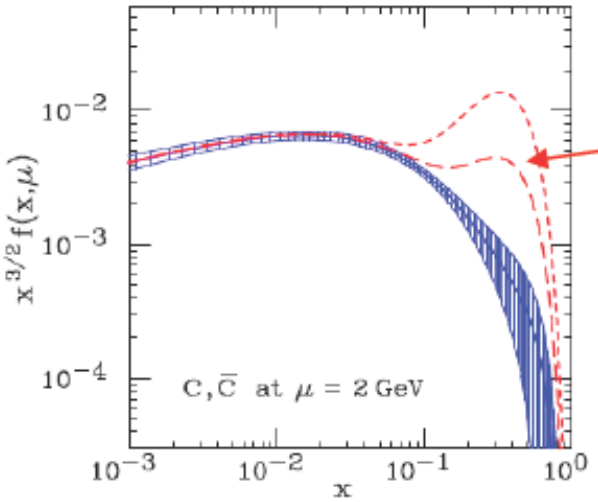
Intrinsic charm

Slide by
Marco Stratmann

here is what they find ...

- fit very insensitive to $\langle x \rangle_{c+\bar{c}}$
- no evidence either for or against IC up to $\langle x \rangle_{c+\bar{c}} \simeq 0.01$
- $\langle x \rangle_{c+\bar{c}} \gtrsim 0.02$ ruled out

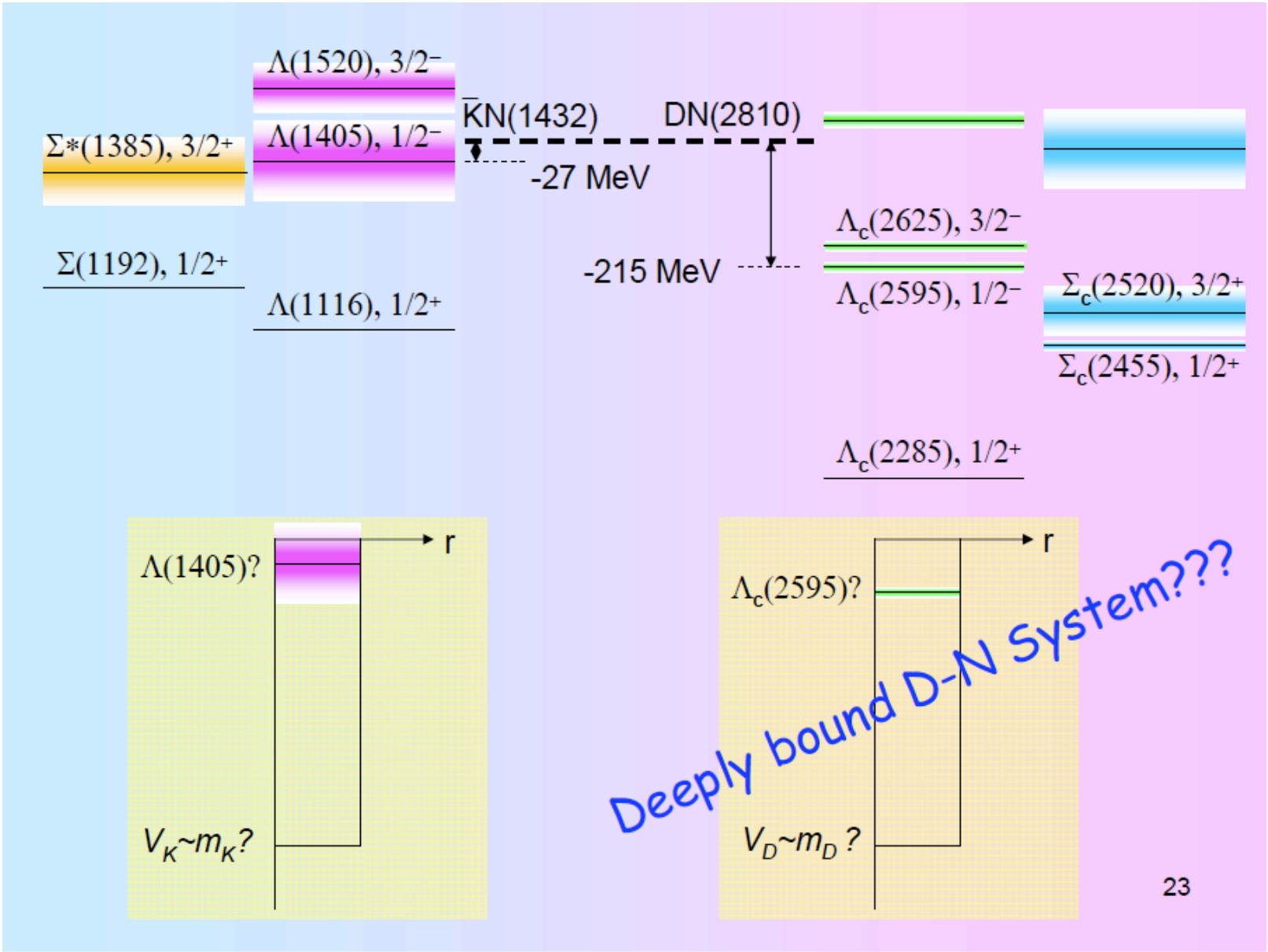




IC can be significant at large x but c(x) still smaller than u(x), d(x), and g(x) !

CTEQ 6.5 and 6.6 sets with IC are available from www.cteq.org !!

April 7th, 2008 RIKEN Workshop on J-PARC Physics 39


Λ(1520), 3/2⁻
Σ*(1385), 3/2⁺
Λ(1405), 1/2⁻
K̄N(1432)
DN(2810)
-27 MeV
-215 MeV
Σ(1192), 1/2⁺
Λ(1116), 1/2⁺
Λc(2625), 3/2⁻
Λc(2595), 1/2⁻
Σc(2520), 3/2⁺
Σc(2455), 1/2⁺
Λc(2285), 1/2⁺
Λ(1405)?
r
VK~mK?
Λc(2595)?
r
VD~mD ?
Deeply bound D-N System???

Brain-storming!

- **Why at magic gamma?**

$$\vec{\omega}_a = -\frac{e}{m}\left[a_\mu \vec{B} - \left(a_\mu - \frac{1}{\gamma^2 - 1}\right)\frac{\vec{\beta}\times\vec{E}}{c} + \frac{\eta}{2}\left(\vec{\beta}\times\vec{B} + \frac{\vec{E}}{c}\right)\right]$$

- **What if no E-field?**

  ⇒requires ultra cooled muon beam Δp/p << 1e-6

  Muon collider technique? Cooling, FFAG etc.

  Ultra-Slow Muon Source at J-PARC MLF?

key point?

大型Legoスペクトロメータ：ハドロン
全て測る・モジュール化する・自在に変形する

高分解能：大強度の利用：ハイパー核
分解能に特化・分散整合

ホール拡張：K1.8 & K1.1 小回りの利く研究・人材育成
vs. アイデアの空洞化

共存：　人材育成・多くの研究output・運営費

新しいアイデアこそが未来を拓く

精密lattice QCD検証実験？
lattice QCDを越えた物理？