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6.12.01

the art , the questions and the answers

of lepton-nucleon scattering may disappear

in this decade.

• notably by an appeal to history :
 that would endanger ee & pp as well.

	ℓP	e^+e^-	PP(?)
70/80	QPM / QCD	g	W,Z — 2σ
90s	g, l mix	W,Z	t, h' x — 200
10s	lq, sat.	⊤	h, susy ? — 2000

ee
t ↗
ν,eq — qq — √s
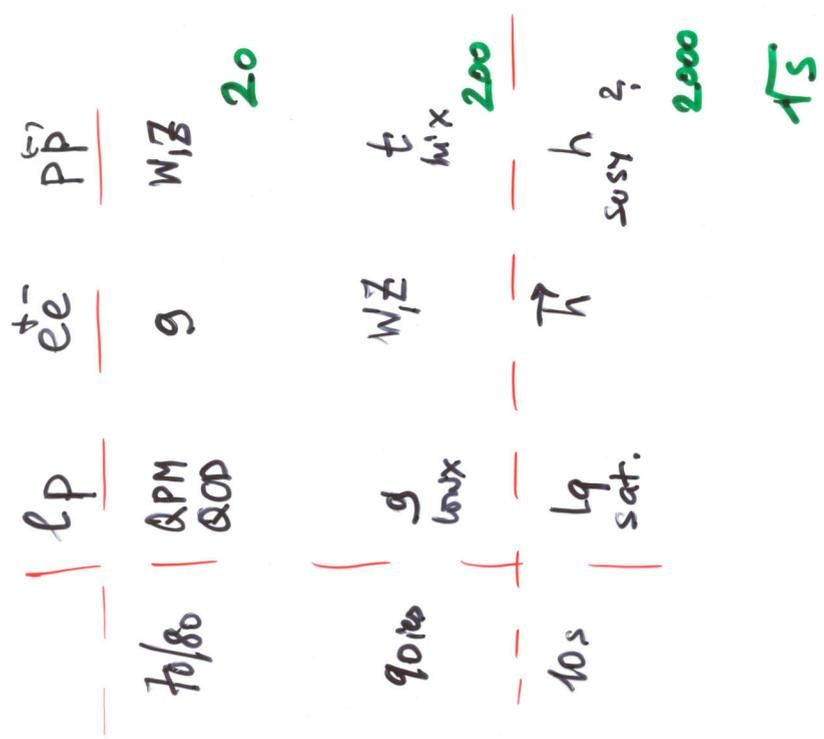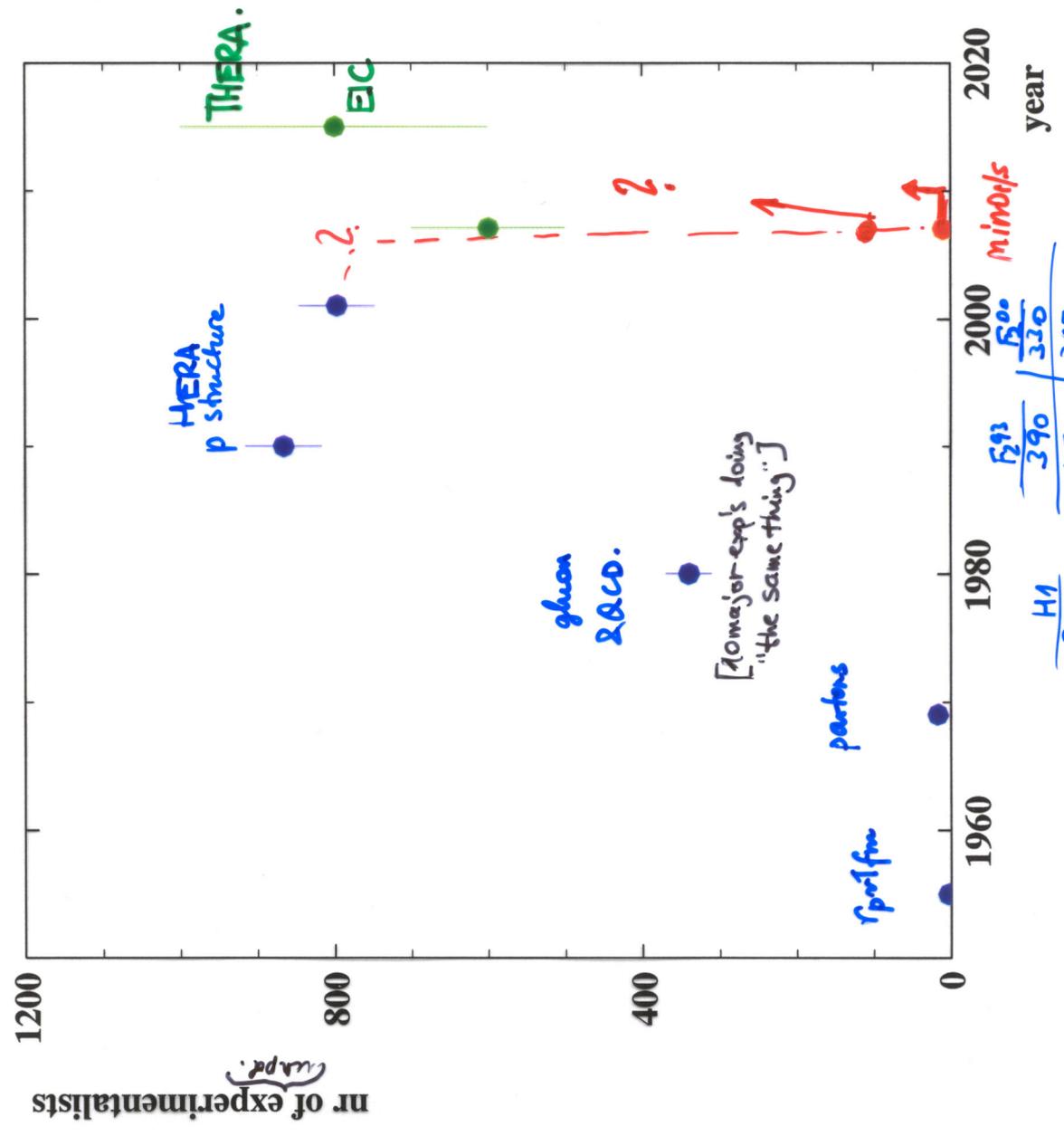
triple coexistence, no dualism.

so far.

nr of experimentalists (appr.)

1200

800

400

0

1960   1980   2000   2020   year

Γ_p, f_{nn}
partons
gluon, QCD.
[10 major exp's doing "the same thing"]
HERA p structure
THERA.
EIC.
m in 10^4/s

H1 / ZEUS
5^{93} / 390 | 476
5^{00} / 336 | 367.

? 2. 2.

atomic nucleus. 1909.

zh prints.

Physics and Experimentation at a Linear Electron–Positron Collider

Volume 4: The THERA Book. [406p's]
Electron–Proton Scattering at $\sqrt{s} \sim 1$ TeV

THERA DETECTOR

removable for hi $Q^2, \mathcal{L}$
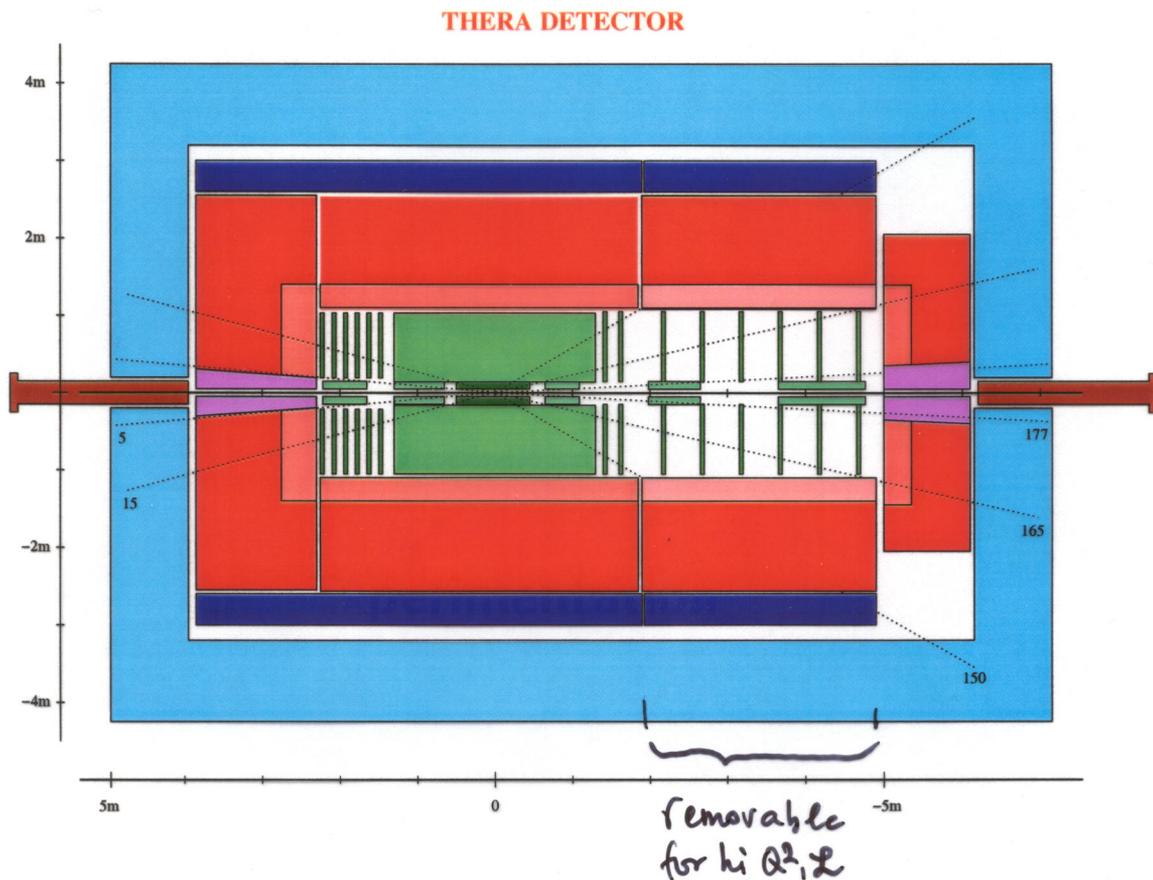
Editors: U. Katz, M. Klein, A. Levy and S. Schlenstedt

www.ifh.de/thera

G. Altarelli·· N. Zotov.

with $1\,fb^{-1}$, in 2006 (?), we may view the world differently and may just want higher $\mathcal{L}$! yet:

three problems will be open [which have been raised/studied with HERA]:

1. the partonic structure of the neutron

   eD :   s, c, F_2^n, u/d , $\bar{u} - \bar{d}$, $\underline{\Delta s \cdots}$

   $\hspace{9cm}$ unification

2. gluon saturation and confinement / mass is in p,n

   / not in the Higgs

   ep, eA :   xg at lower x , diffraction

3. the nucleon spin composition.

   $\vec{e}\vec{p}, \vec{e}\vec{D}$:   low x and high Q^2

[all these problems 1-3 will pass any
scientific advisory/review committee if
accompanied by convincing solutions/proposals.

access to $xg(x,Q^2)$ in DIS at low x.
$d_s \ll 1$

xg

THERA-A

$Q^2 = 20\,GeV^2$

HERA-A

$Q^2 = 5\,GeV^2$

EIC-A

THERA-p

HERA-p

EIC-p

H1 NLO massive
$Q^2_{min} = 3.5\,GeV^2$

AGN γRb

dirty
LHC

10^{-8} 10^{-6} 10^{-4} x_p, x 10^{-2}

100
80
60
40
20

M. Klein
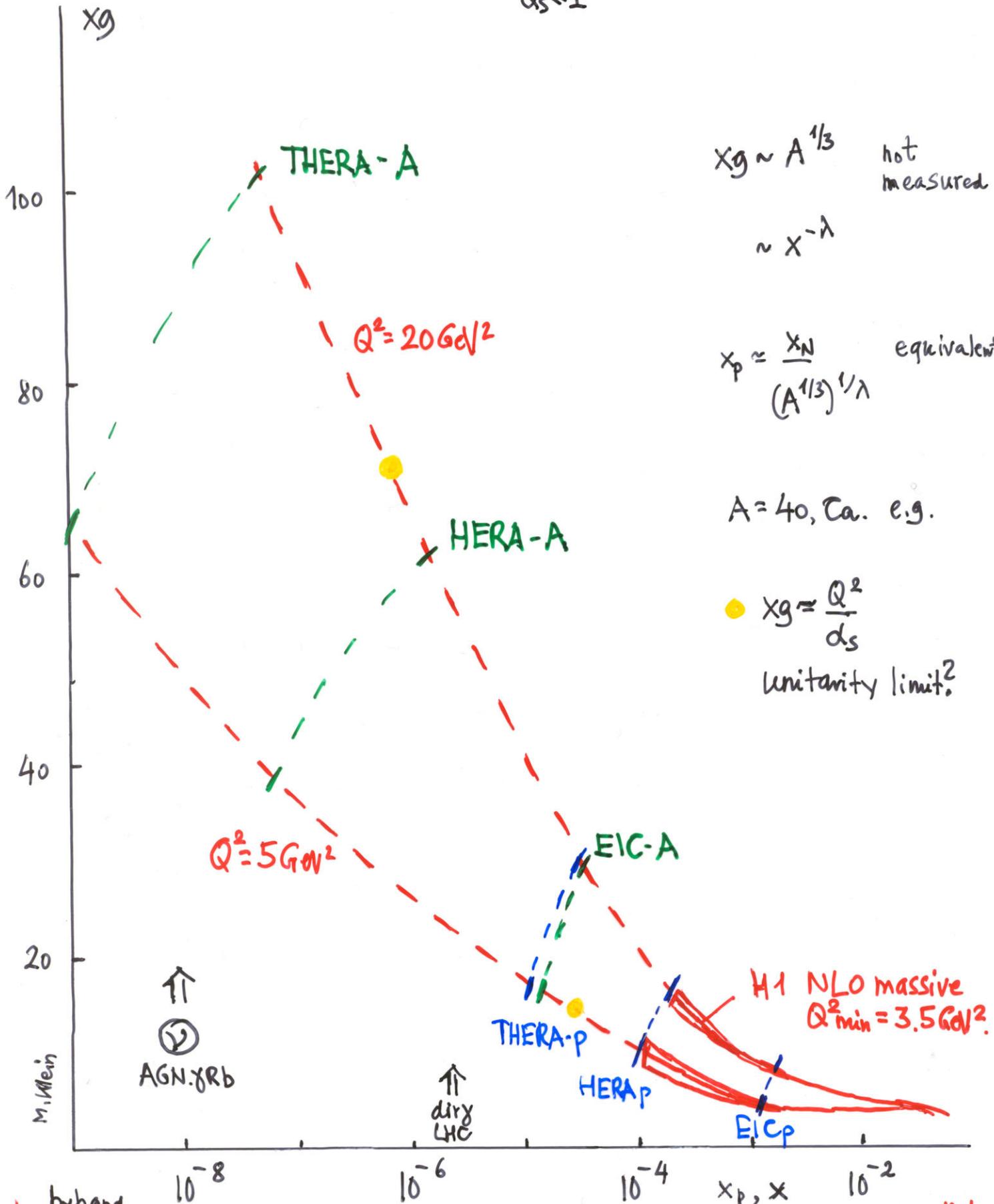
$xg \sim A^{1/3}$ not measured!

$\sim x^{-\lambda}$

$x_p \simeq \dfrac{x_N}{(A^{1/3})^{1/\lambda}}$ equivalent x

$A = 40$, Ca. e.g.

$xg \simeq \dfrac{Q^2}{d_s}$
unitarity limit?

by hand
extrapol., DGLAP, c, $A^{1/3}$, dilution, tagging, E_A, y_{max}, unitarity...   may all be different!
need p AND A at highest energy and at modest energy.

EIC E_e=10 GeV E_p=250 GeV
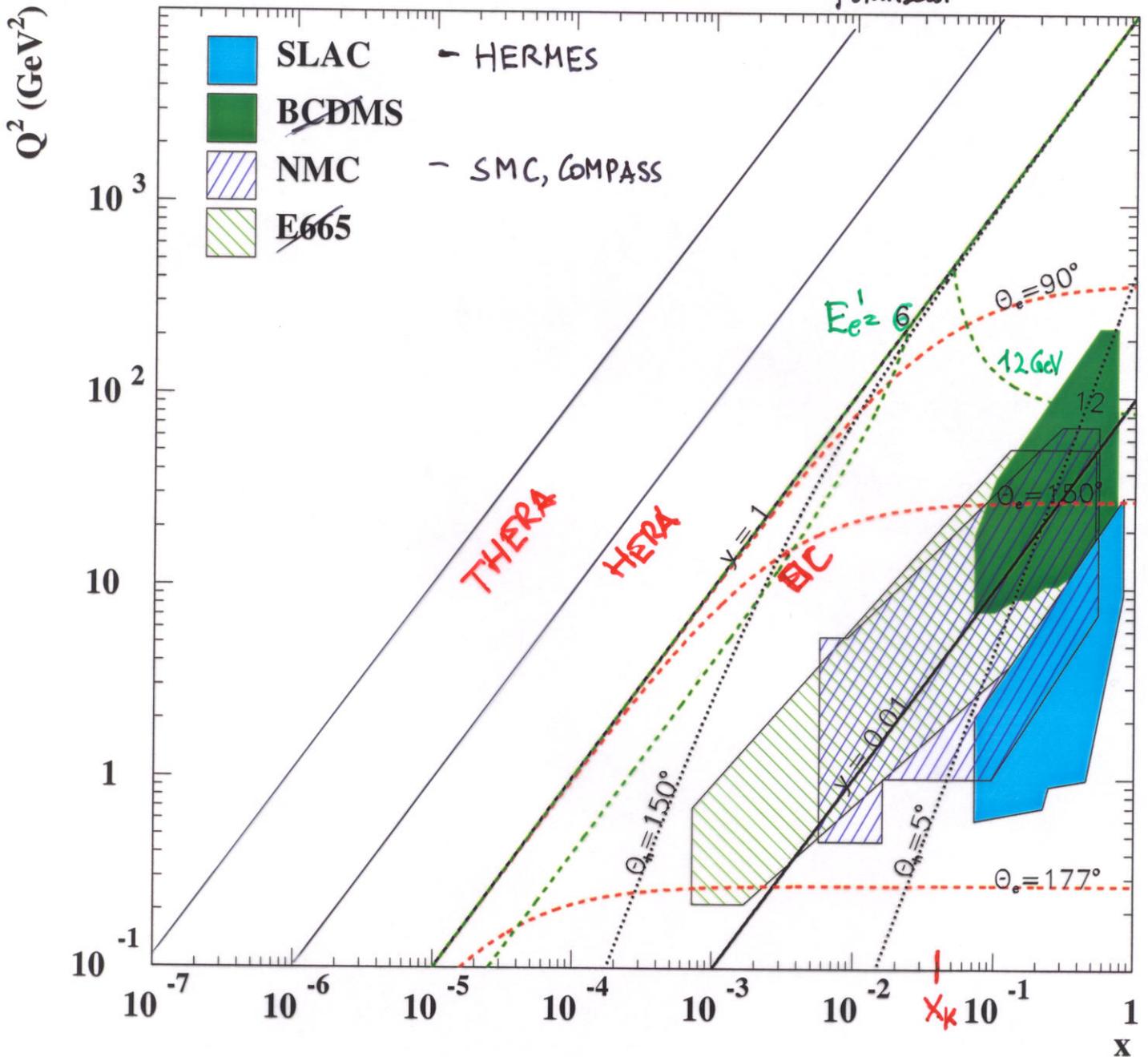
$S=4E_eE_p=10^4 GeV^2$

$Q^2 = sxy \leq S$
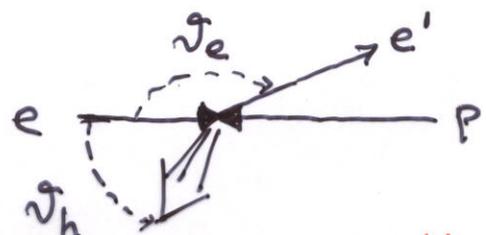
this community better agrees on *a scenario* on which
planning, studies, requests, PR and science can rely.

for example!

- 2007 : $e^{\pm} D$. 50 pb^{-1} each , H1/ZEUS "untouched"
  1+1   HERMES recoils with D . • HERA: p→D.

- 2008/9 : i.a regions back to low x , low dispersion, lower $\mathcal{L}$ $\vec{eD}$
  2+1   ep, eD, eO, eCa   tag p,n.
  • detectors upgraded in fwd , bwd , central region
    HERA runs p, d ;A . HERMES continues r/and
                        joins . Compass goes North.

  det upgrades

  TESLA ?

- 2010/12 : i.a region(s) back to high $\mathcal{L}$. • $\vec{p}, \vec{D}$ polarised n.
  3+1   unification of collaborations

  [6..9 year programme].

- 2012/.. EIC $\vec{ep}$ with 10..100 times $\mathcal{L}$. eA in mid range
                                                            min.

- 201? THERA : low x low $\mathcal{L}$ asymmetric
                high Q^2 hi' $\mathcal{L}$.   symmetric Ee, Ep.

extend collaboration
agreements to eD ?

simultaneously ?

eA

a procedure
towards proposals for
future lN scattering

- meet at BNL 28/2 · 2/3 2002.

- "future lN"$_2$ *)) : end of march : report to DIS02
   attract wider   Cracow end of April.
   part of community/ies

- Letters of intent : October 2002.   *)
   build upon/around existing
   HERA detectors/collaborations.

- proposals : October 2003 for eA and $\overrightarrow{e}\overrightarrow{N}$
   – a globally coordinated request –

*) major physics problems [in understandable fashion]
Key detector upgrade/building possibilities
major machine issues

*)) "future of lN" 2002/03 into ECFA?
   DESY directorate

? confinement, really
? fwd questions
   tag – ℓ
? $\overrightarrow{D}$ and O
:   :

initiative towards public & community (HEP)
understanding of the science & lN scattering.