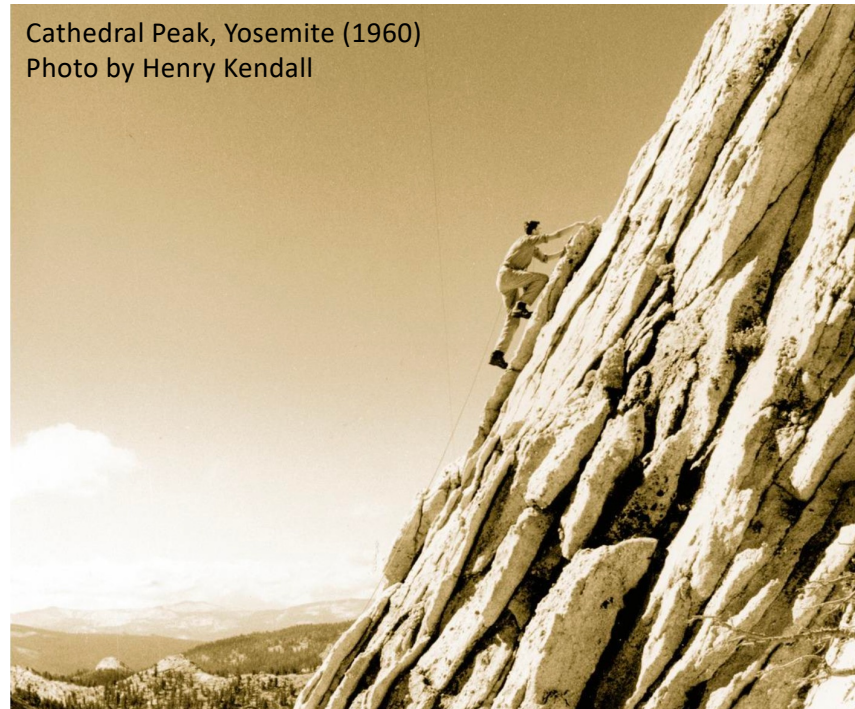


James Daniel Bjorken (Bj)

(June 22, 1934-August 6, 2024)



Raju Venugopalan, RHIC & AGS Users Meeting, May 15, 2026

Bj-scientist extraordinaire

Bj was one of the great physicists of the modern era whose insights revolutionized our understanding of the standard model of physics

His contributions ranged from formal theory, to phenomenology, to the design, construction and data analysis of high energy experiments, and even to the design of particle accelerators

His books+articles were models of scientific exposition and clarity, inspiring several generations of students and collaborators

He was also an extraordinarily humble and honest human being who talked exactly the same way to everyone - regardless of rank and station

I will briefly outline chronologically some of his principal contributions, with emphasis on those that are relevant to this audience



If I have seen further, it is by standing on the shoulders of giants –Isaac Newton

Bj-early years

Born in Chicago to immigrant Swedish parents

Big Cubs Fan 

Undergrad at MIT (Won Putnam Competition in Mathematics-1954)

Ph.D at Stanford with Sid Drell

Bj and Sid Drell's QM and QFT books became instant classics and were my introduction to the field as an undergraduate

Though not standard texts anymore, they contain a lot of material which is being rediscovered in modern form (S-matrix theory)

Classic quote: *Quantum Electrodynamics has reached a status of peaceful coexistence with its infinities*



Bjorken and Drell (1964-65)
Vol I: Relativistic Quantum Mechanics
Vol: II Relativistic Quantum Fields

Bj –the glory years

1964: Bj and Sidney Glashow proposed the existence of charm quarks

- The J/Ψ (charm-anticharm bound state) was discovered at BNL and SLAC in 1974
- Nobel prize to Sam Ting and Burton Richter

1966-1969: Seminal contributions to current algebra, light cone expansions, sum rules

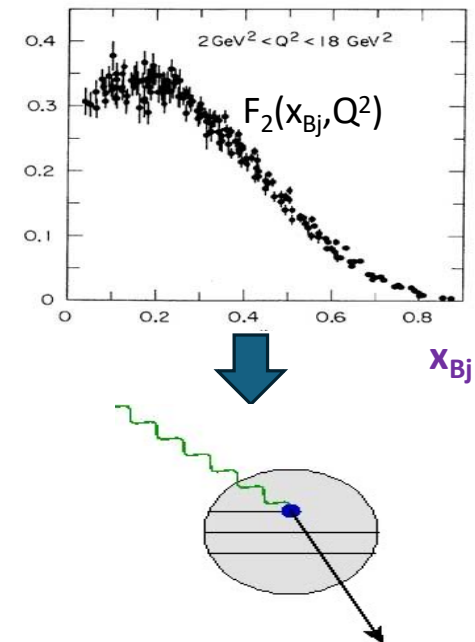
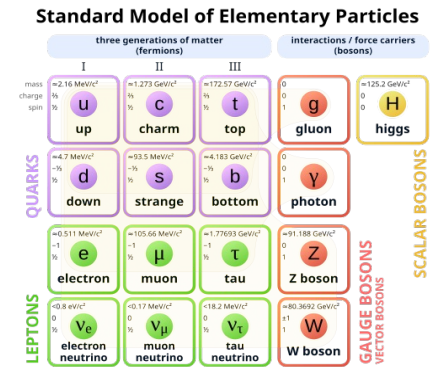
- set stage for Ken Wilson's foundational work on the Operator Product Expansion
- Bjorken spin sum rule – measurements provide key test of precision QCD

1968: Proposed Bjorken scaling of SLAC deeply inelastic scattering data

- Lead to the Bjorken/Feynman "parton model" of point-like quarks inside protons
- Nobel Prize to Friedman, Kendall and Taylor for the DIS experiments

1970-1971: QFT basis of the parton model – "light front" picture of "wee partons"

Bj's ideas deeply influence all aspects of the EIC science program



Bjorken's vision: the Quark-Gluon Plasma at RHIC+LHC

PHYSICAL REVIEW D

VOLUME 27, NUMBER 1

1 JANUARY 1983

Bj's most highly cited paper
(most highly cited heavy-ion theory paper)

Highly relativistic nucleus-nucleus collisions: The central rapidity region

J. D. Bjorken

Fermi National Accelerator Laboratory, * P.O. Box 500, Batavia, Illinois 60510

(Received 13 August 1982)

The space-time evolution of the hadronic matter produced in the central rapidity region in extreme relativistic nucleus-nucleus collisions is described. We find, in agreement with previous studies, that quark-gluon plasma is produced at a temperature $\gtrsim 200\text{--}300\text{ MeV}$, and that it should survive over a time scale $\gtrsim 5\text{ fm}/c$. Our description relies on the existence of a flat central plateau and on the applicability of hydrodynamics.

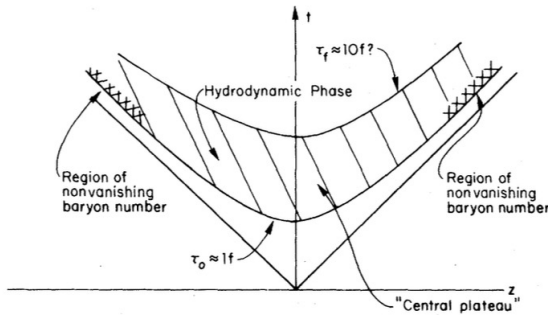
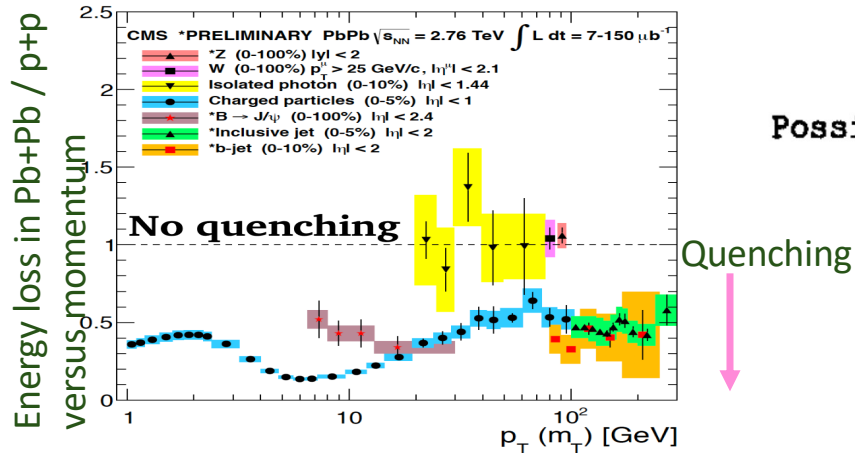


FIG. 3. Space-time diagram of longitudinal evolution of the quark-gluon plasma.



Prediction of jet quenching in the QGP

Energy Loss of Energetic Partons in Quark-Gluon Plasma:
Possible Extinction of High p_T Jets in Hadron-Hadron Collisions.

J. D. BJORKEN

Fermi National Accelerator Laboratory
P.O. Box 500, Batavia, Illinois 60510

FERMILAB-Pub-82/59-THY
August, 1982

Bj's legacy*

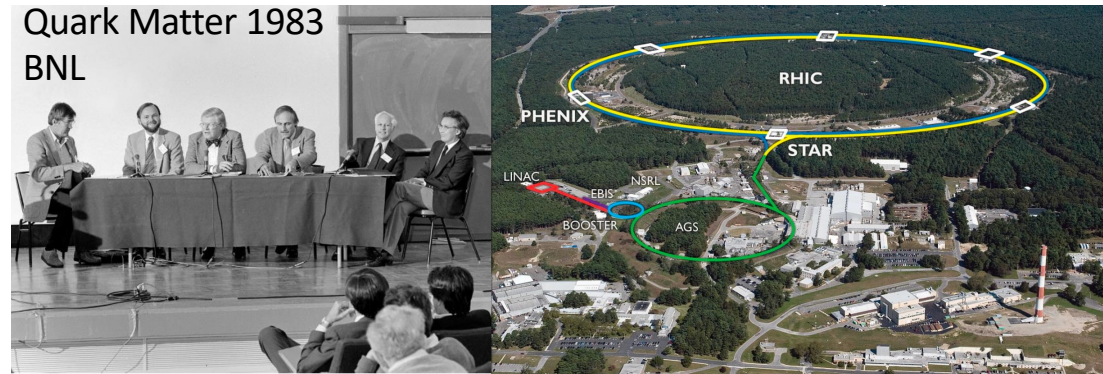
Bj spent most of his career at SLAC and Fermilab. He provided a role model for Lab theorists everywhere – and was deeply influential in winning wide acceptance for RHIC science in the high energy physics community and beyond

He attended the first eRHIC meeting we organized in December 1999, physics that was close to his heart

Bj maintained an active interest in RHIC+EIC science (he was very up to date on the literature) - he would drop in at BNL unexpectedly and we corresponded intermittently

My last email to Bj was on April 28th 2024 – shortly before he passed away... I wrote because I had come across his reminiscences on his career upon winning the Wolf Prize. I strongly recommend this to anyone interested in this *homem sui generis* and his legacy

J. D. Bjorken, *Ann.Rev.Nucl.Part.Sci.* 70 (2020) 1-20



* Why do we do Physics? Because Physics is Fun!

RIP Bj