



# Reflecting on the success and impact of the RBRC

Yacine Mehtar-Tani  
Brookhaven National Laboratory

RHIC&AGS Users' Meeting, May 15, 2026

# RBRC and Nuclear Theory at BNL

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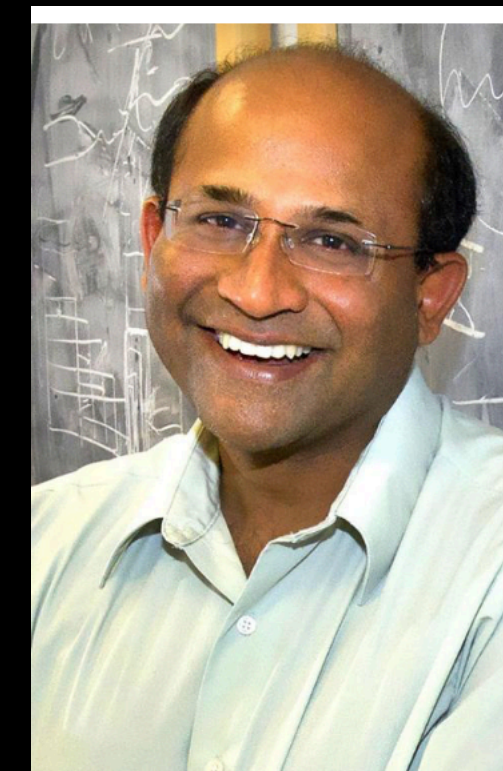
- Major scientific impact across theory, phenomenology, experiment: RBRC helped build the theory community and **conceptual foundations that have shaped the RHIC heavy-ion program** for more than two decades
- Joined BNL Nuclear Theory Group and RBRC in 2018 (RBRC Fellow 2018–2023) - Current and former NT/RBRC fellows:



Yoshitaka Hatta



Farid Salazar



Raju Venugopalan



YMT

# Strengthening Theory–Experiment Collaboration

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# Strengthening Theory–Experiment Collaboration

PHYSICAL REVIEW D **100**, 114023 (2019)

## Background estimator for jet studies in $p+p$ and $A+A$ collisions

Yacine Mehtar-Tani,<sup>1,\*</sup> Alba Soto-Ontoso,<sup>1,†</sup> and Marta Verweij<sup>2,3,4,‡</sup>

<sup>1</sup>Physics Department, Brookhaven National Laboratory, Upton, New York 11973, USA

<sup>2</sup>Department of Physics and Astronomy, Vanderbilt University, Nashville, Tennessee 37235, USA

<sup>3</sup>RIKEN BNL Research Center, Brookhaven National Laboratory, Upton, New York 11973, USA

<sup>4</sup>Institute for Subatomic Physics, Utrecht University, Utrecht, Netherlands

Marta Verweij



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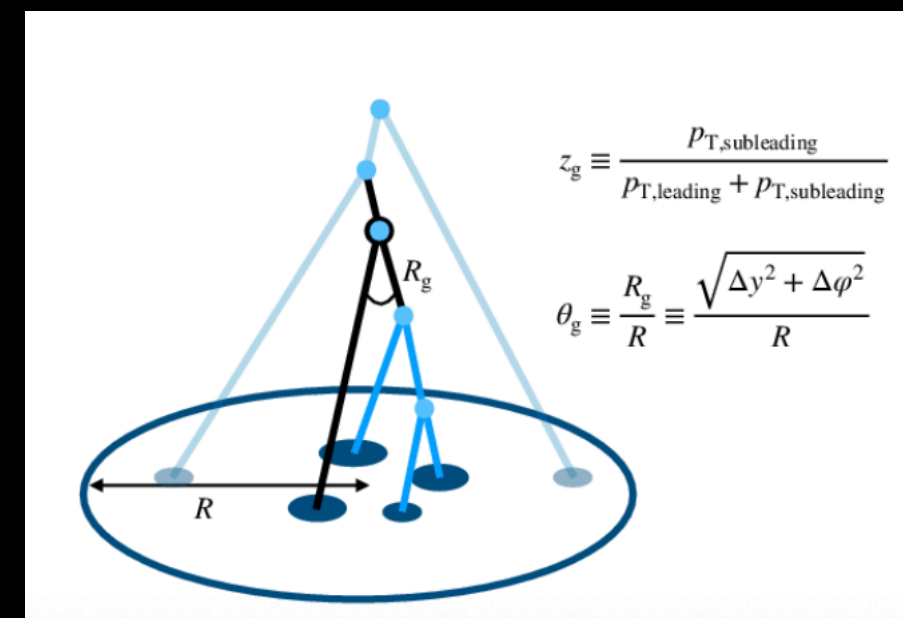
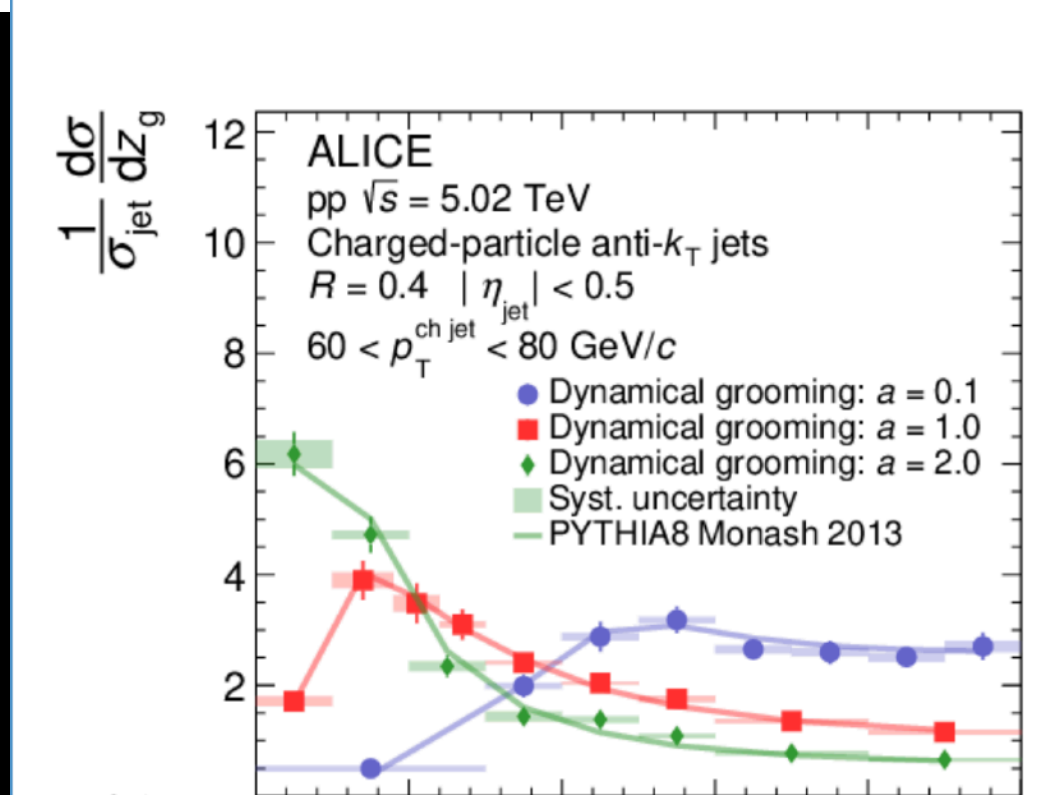


Marta Verweij

PHYSICAL REVIEW D **101**, 034004 (2020)

## Dynamical grooming of QCD jets

Yacine Mehtar-Tani<sup>1,\*</sup>, Alba Soto-Ontoso,<sup>1,†</sup> and Konrad Tywoniuk<sup>2,‡</sup>



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PHYSICAL REVIEW LETTERS **127**, 252301 (2021)

## Cone-Size Dependence of Jet Suppression in Heavy-Ion Collisions

Yacine Mehtar-Tani<sup>\*</sup>

RIKEN BNL Research Center and Physics Department, Brookhaven National Laboratory, Upton, New York 11973, USA

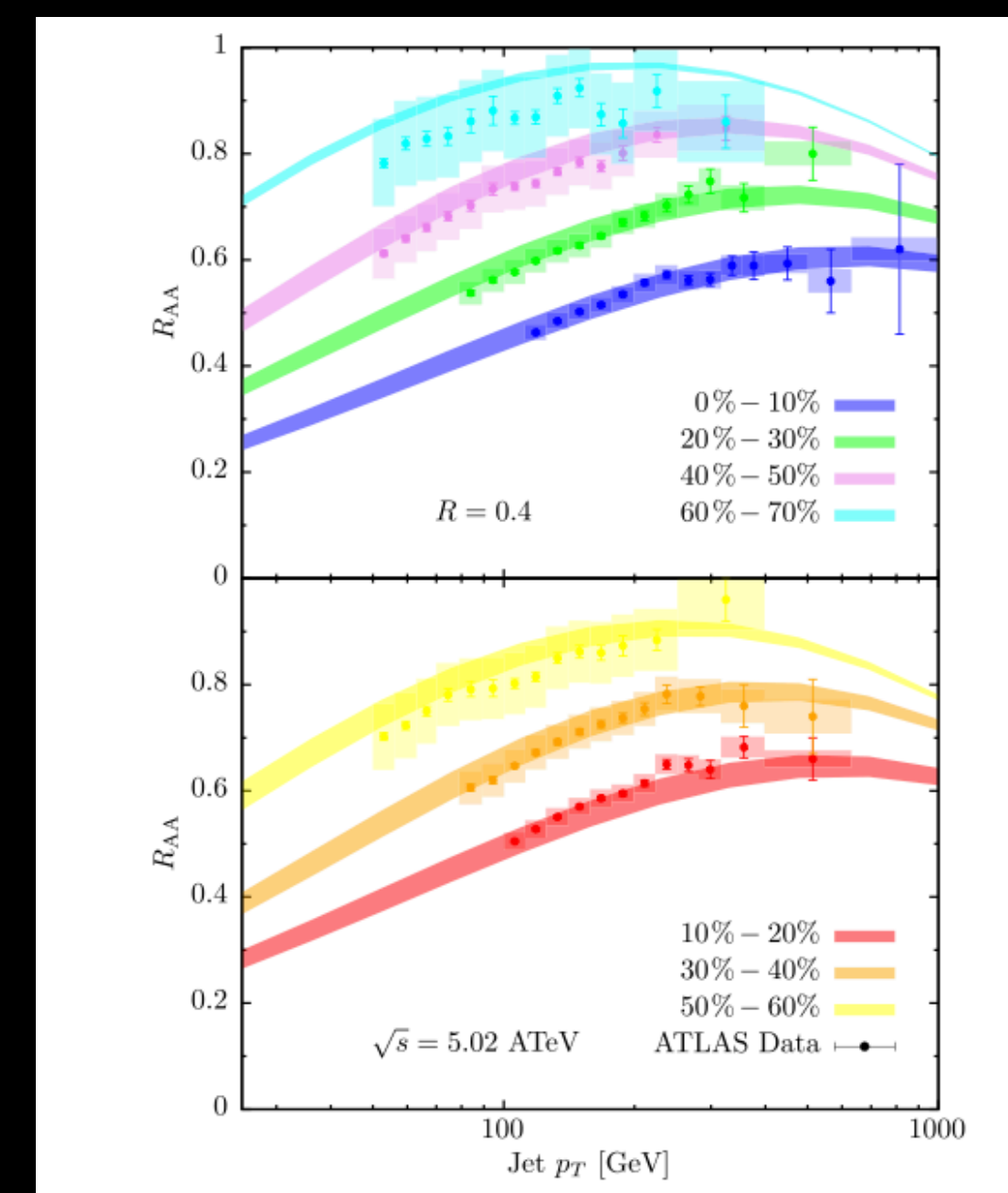
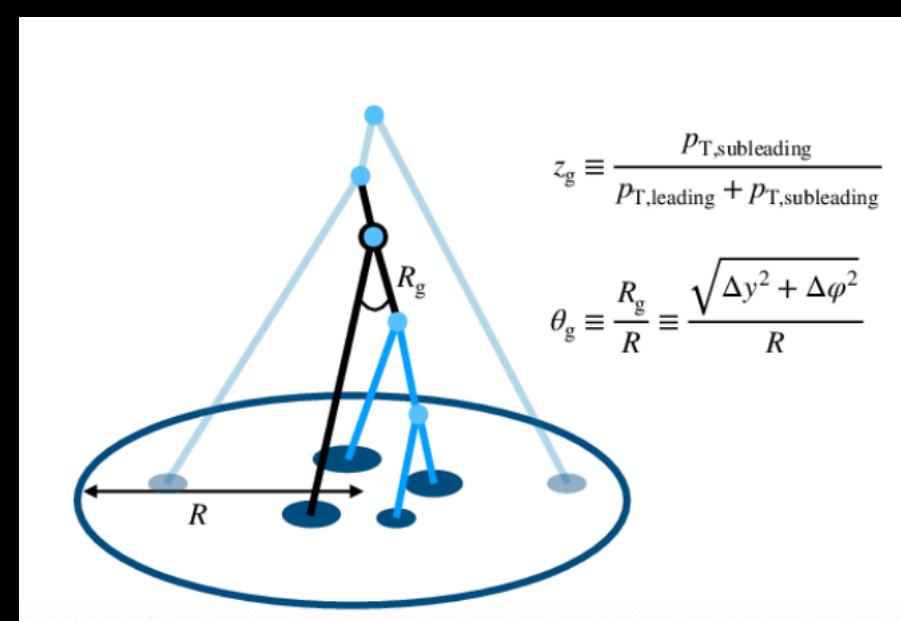
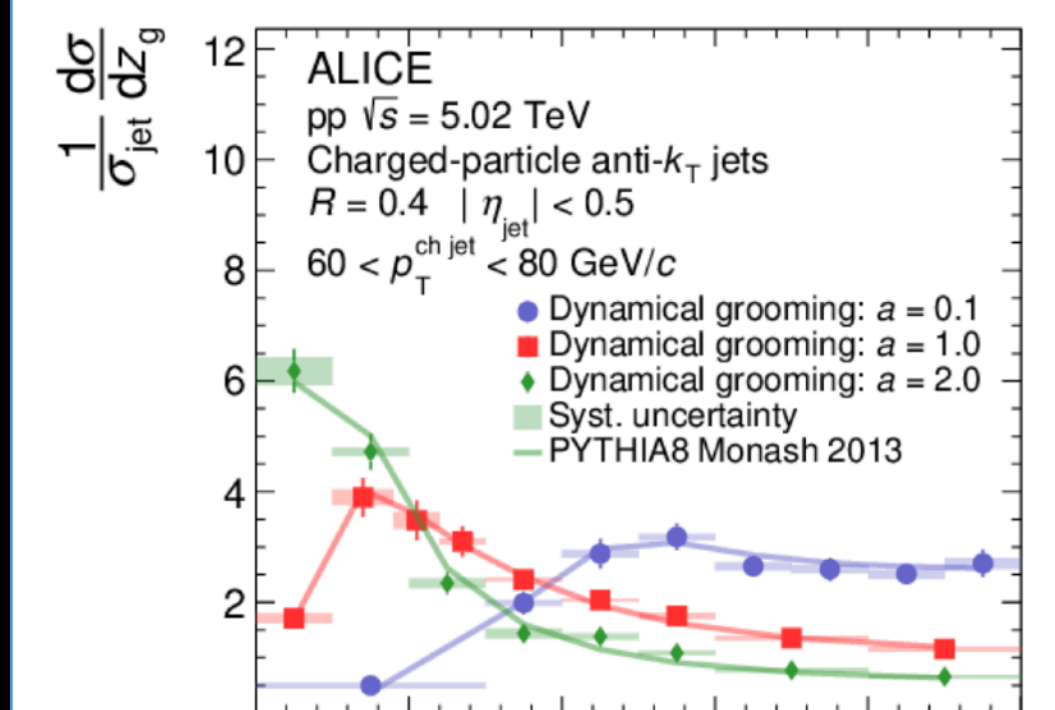
Daniel Pablos<sup>†</sup> and Konrad Tywoniuk<sup>‡</sup>

Department of Physics and Technology, University of Bergen, 5007 Bergen, Norway

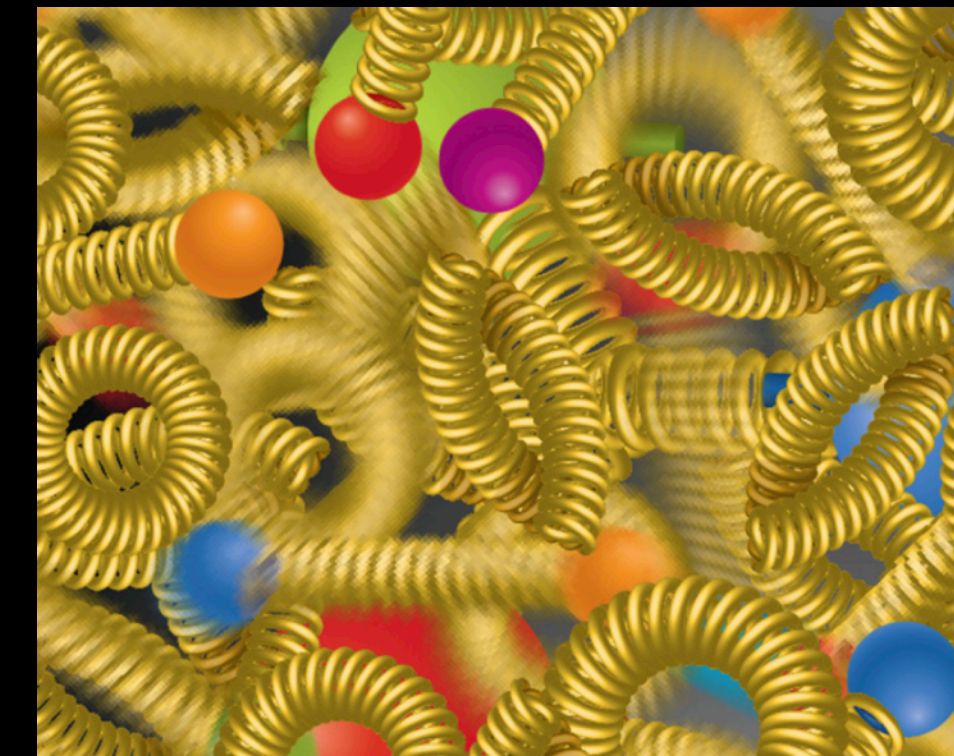
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# Shaping the Theory Foundations of RHIC



Superdiffusion  $\langle p_{\perp}^2 \rangle \sim L^{\alpha}$ ,  $\alpha > 1$

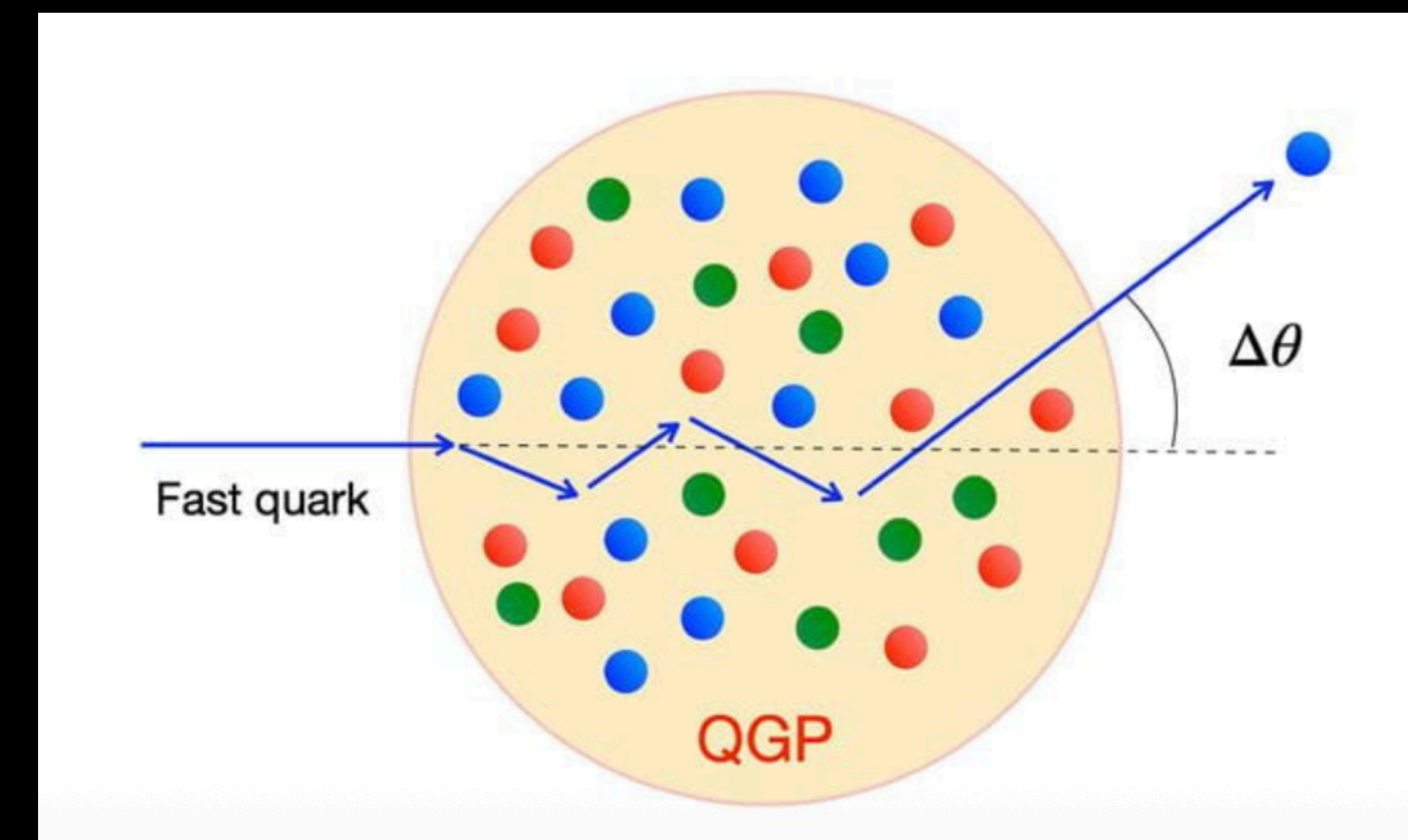
PHYSICAL REVIEW D **106**, L051501 (2022)

Letter

**Anomalous diffusion in QCD matter**

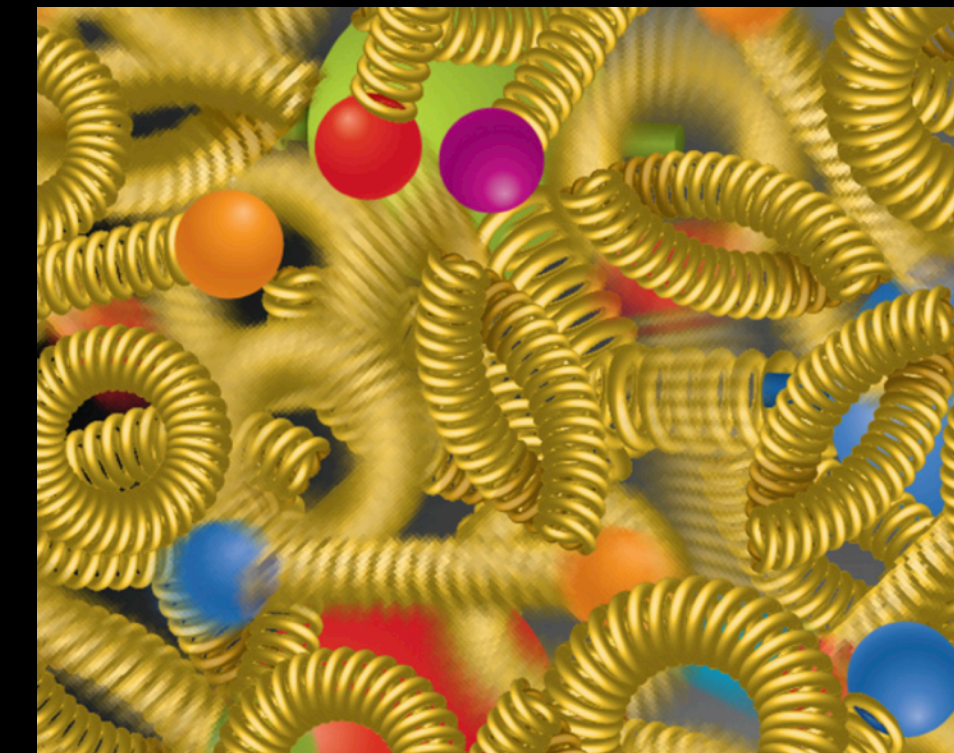
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# Shaping the Theory Foundations of RHIC

- Strong theory–experiment connections



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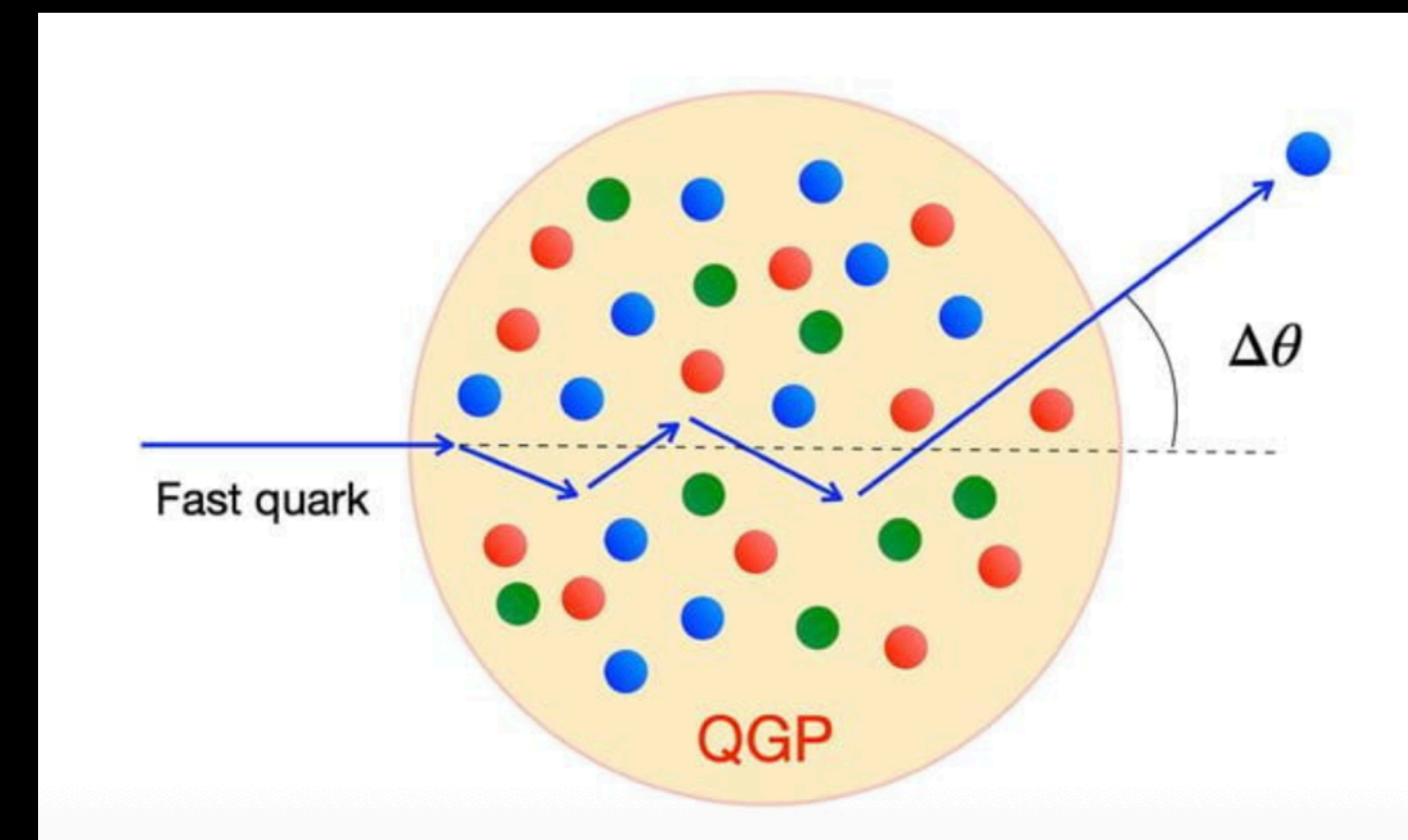
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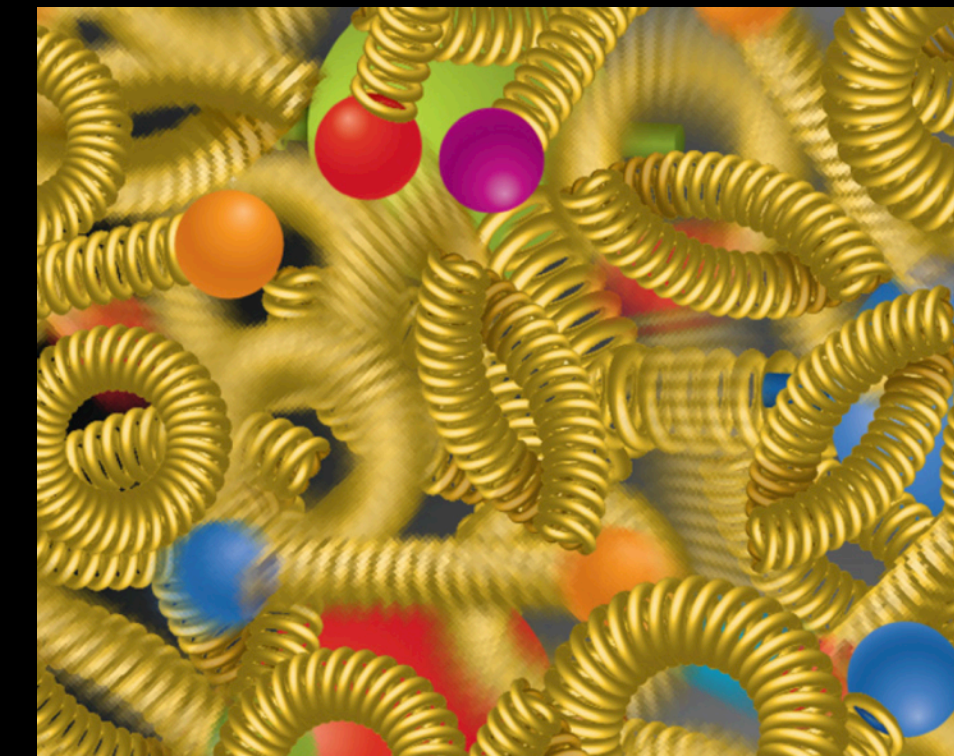
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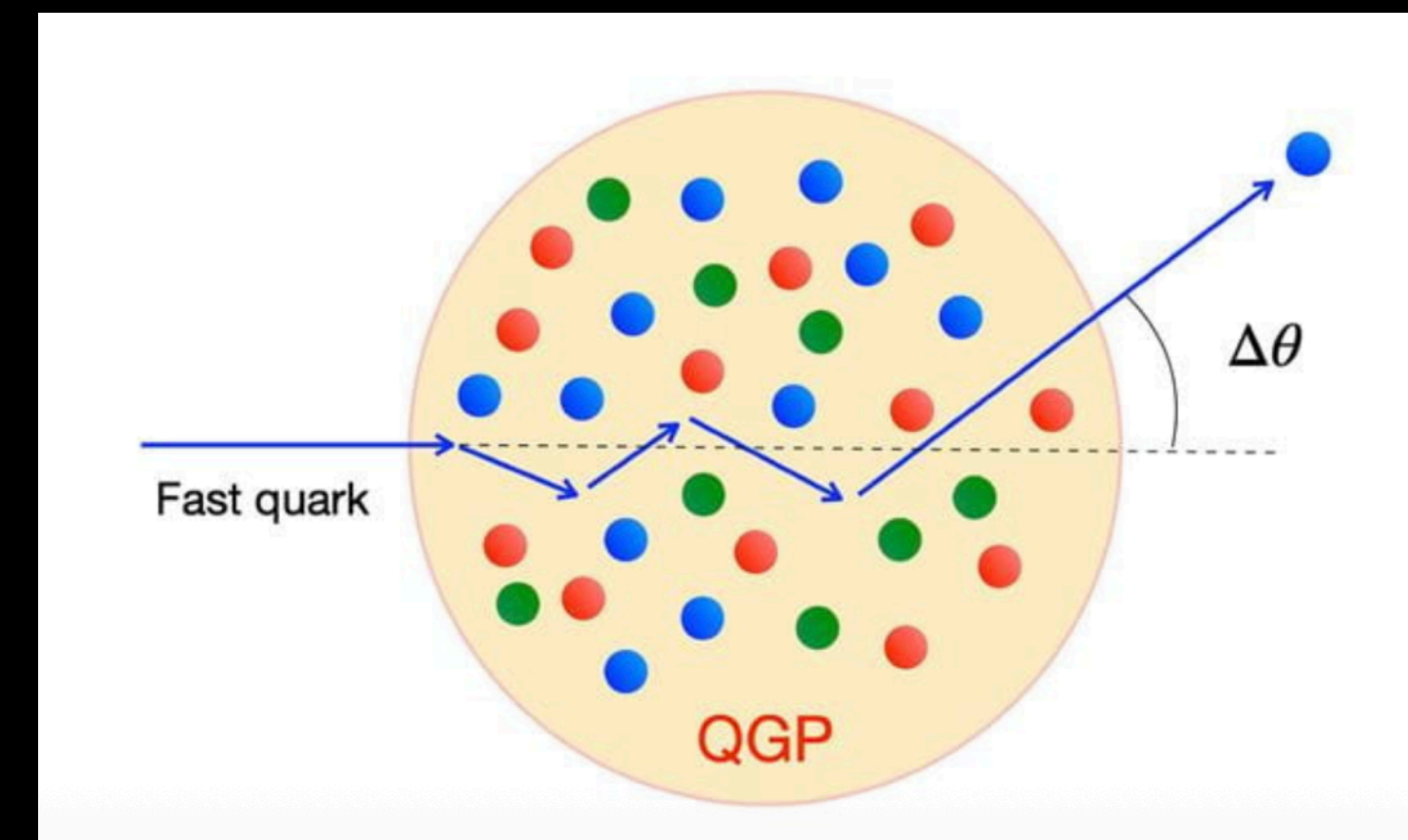
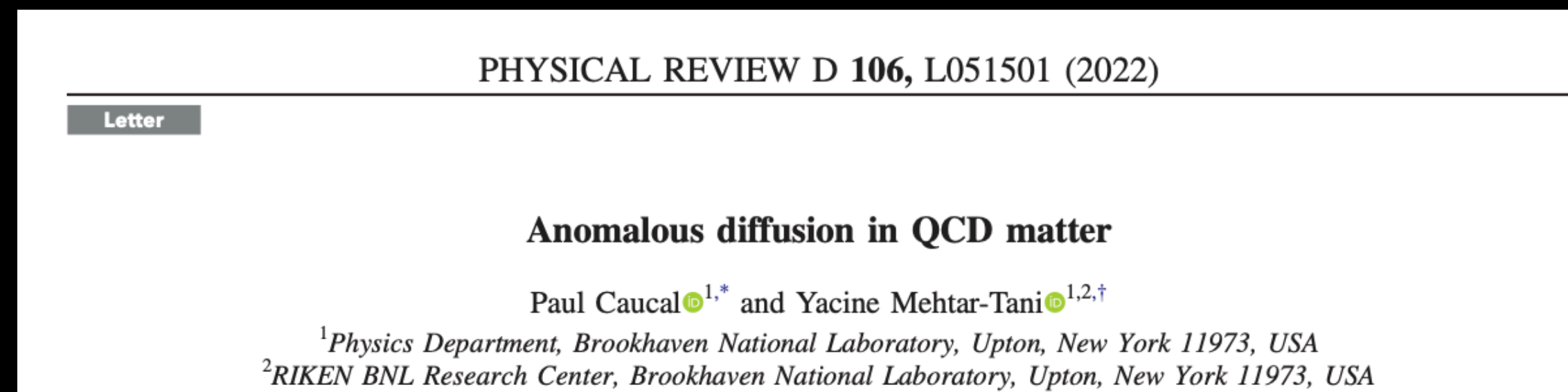


# Shaping the Theory Foundations of RHIC

- Strong theory–experiment connections
- Heavy-ion phenomenology

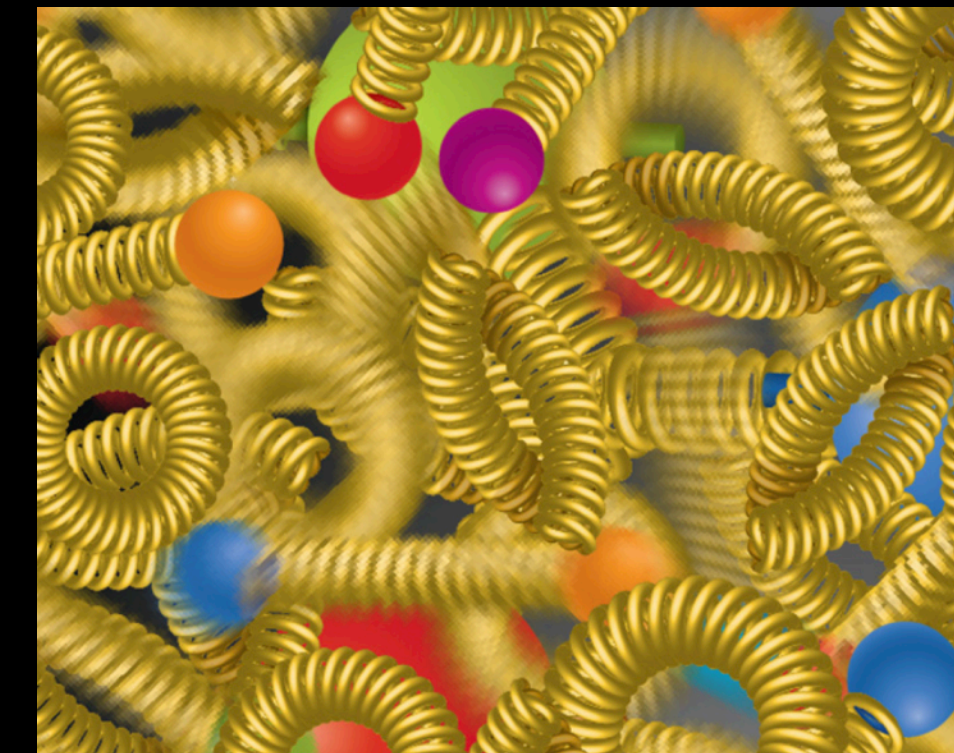


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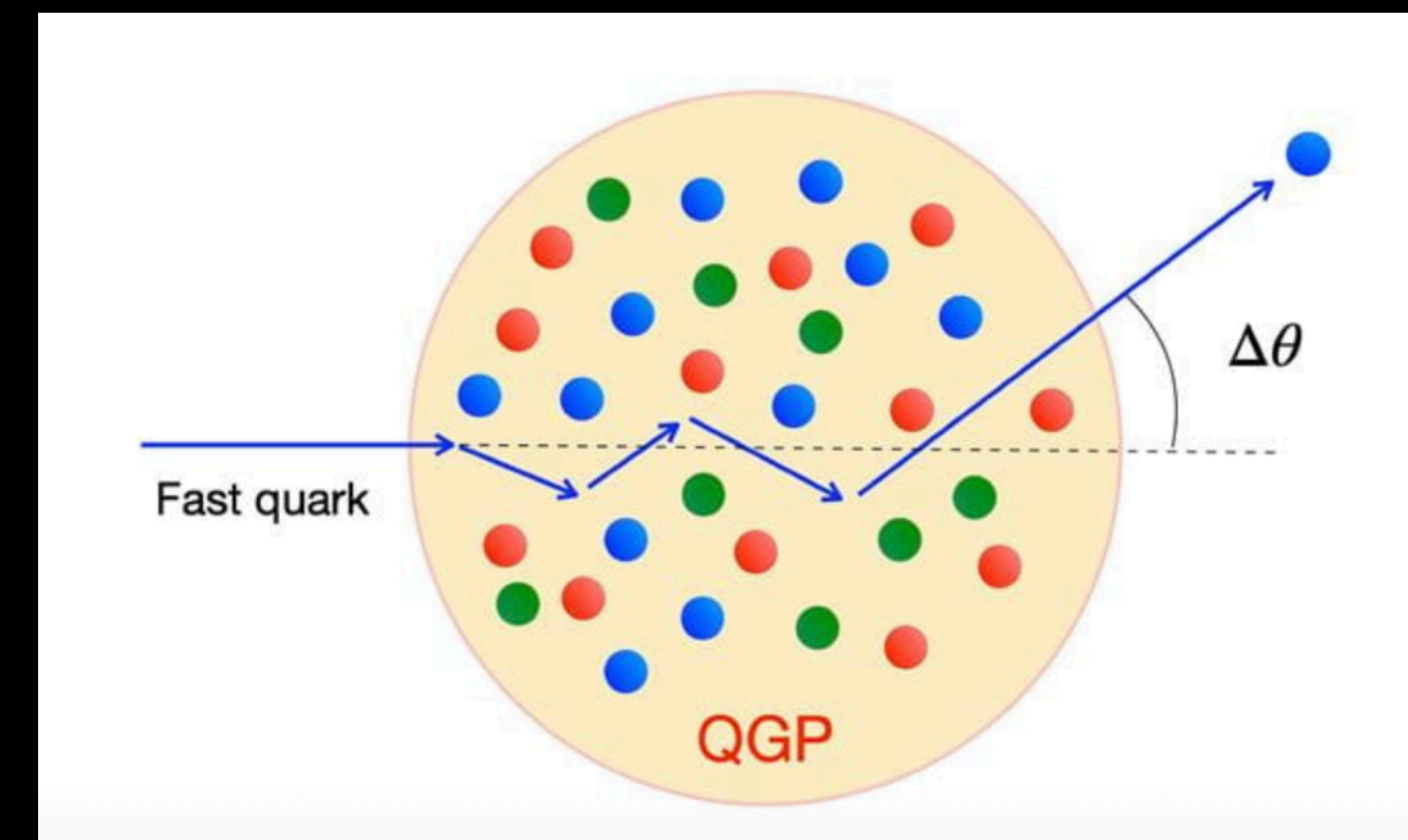
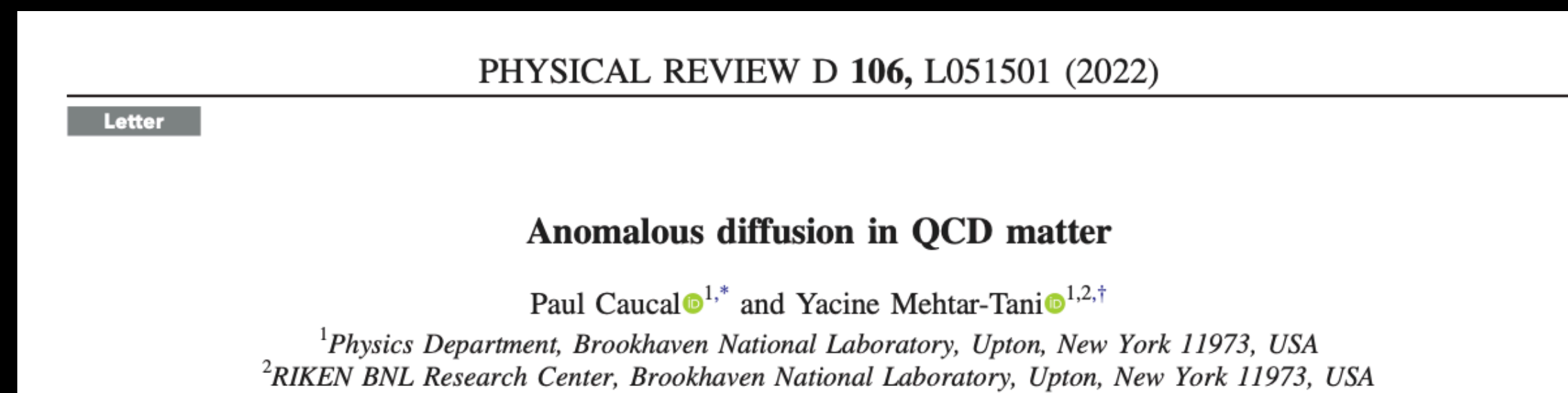


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- Strong theory–experiment connections
- Heavy-ion phenomenology
- Lattice QCD and computing

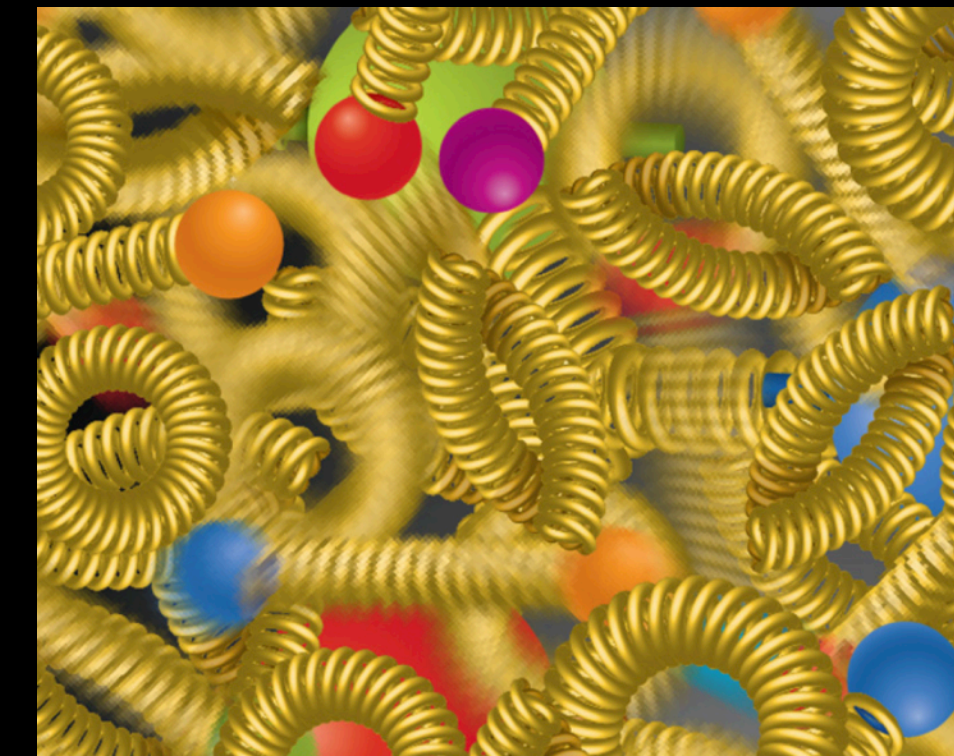


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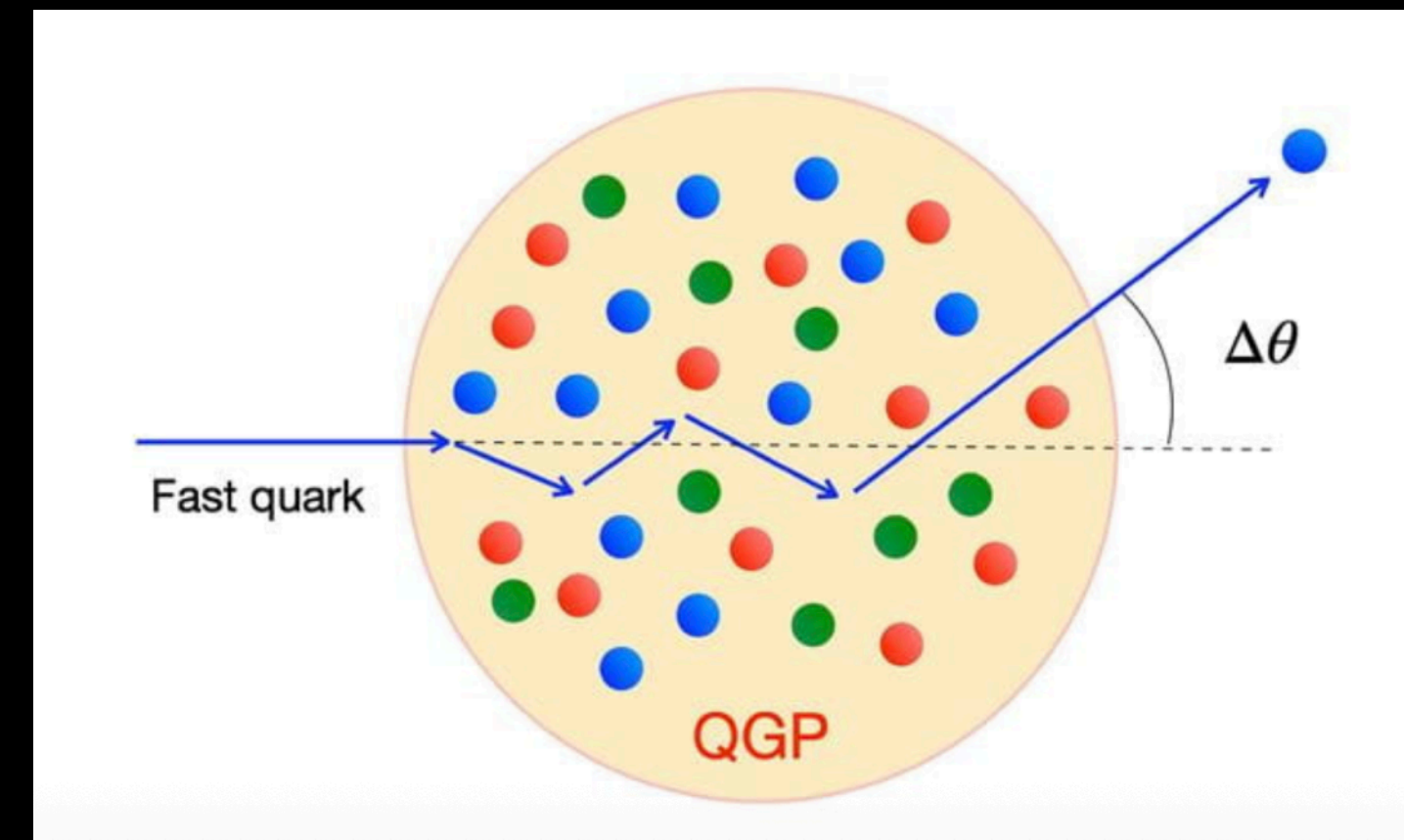
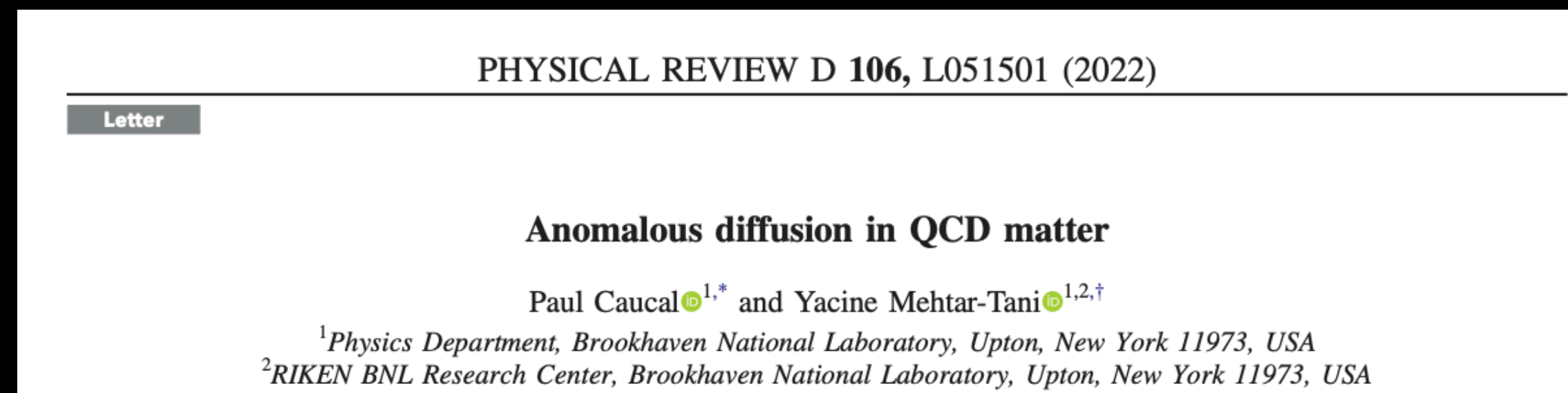


# Shaping the Theory Foundations of RHIC

- Strong theory–experiment connections
- Heavy-ion phenomenology
- Lattice QCD and computing
- Saturation physics / small-x QCD

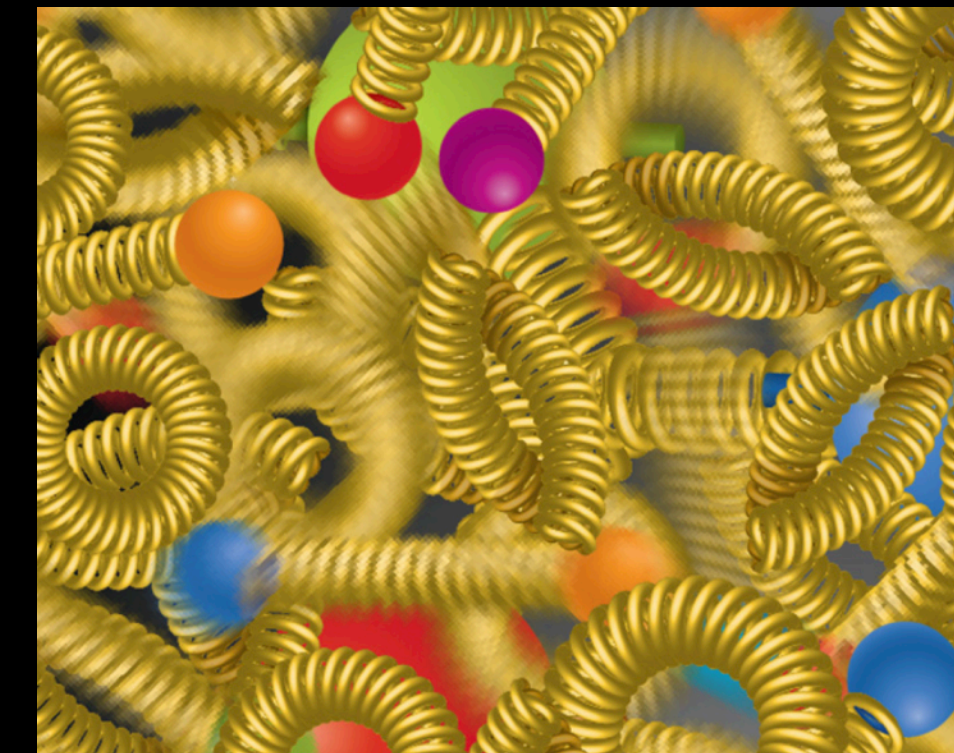


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- Strong theory–experiment connections
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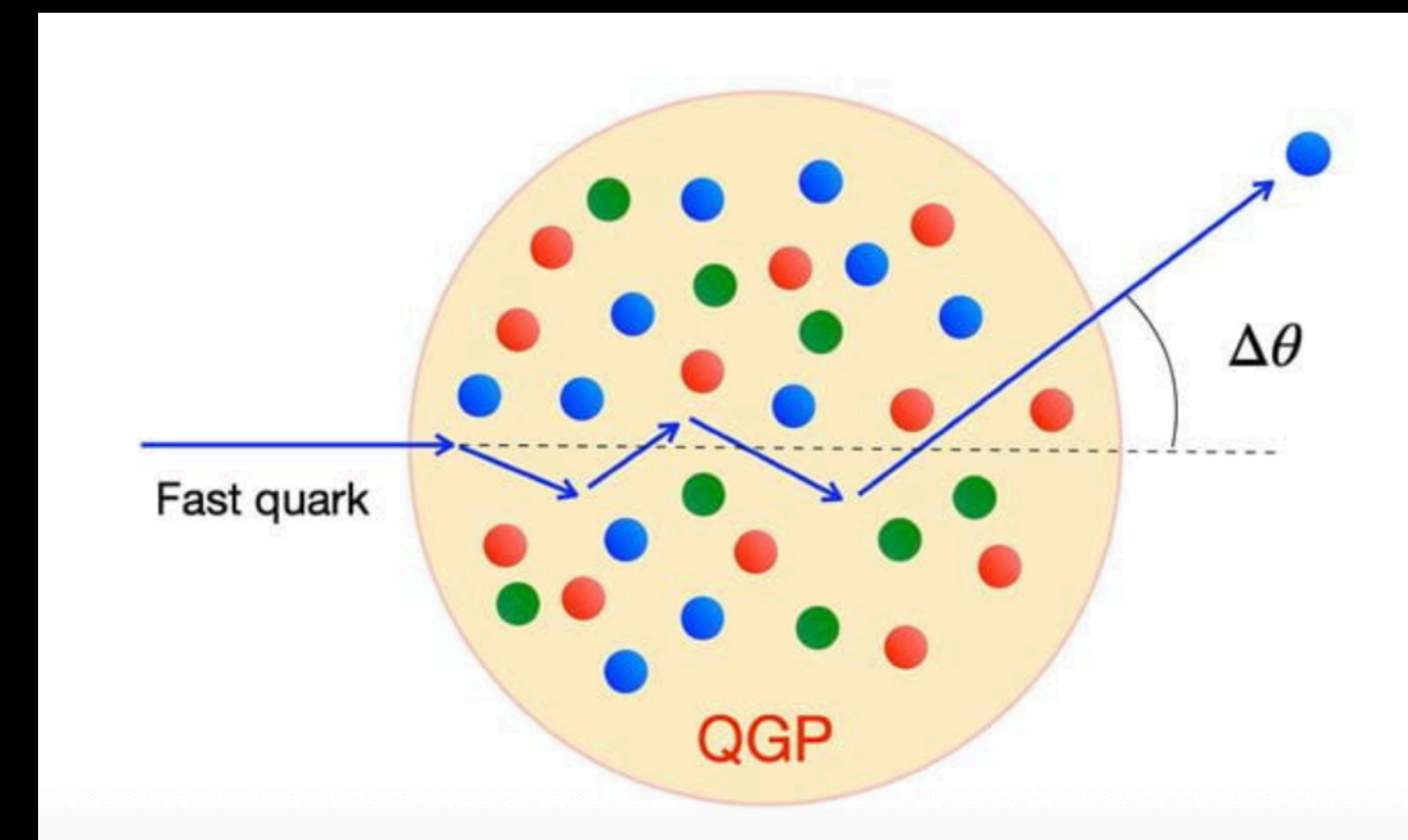
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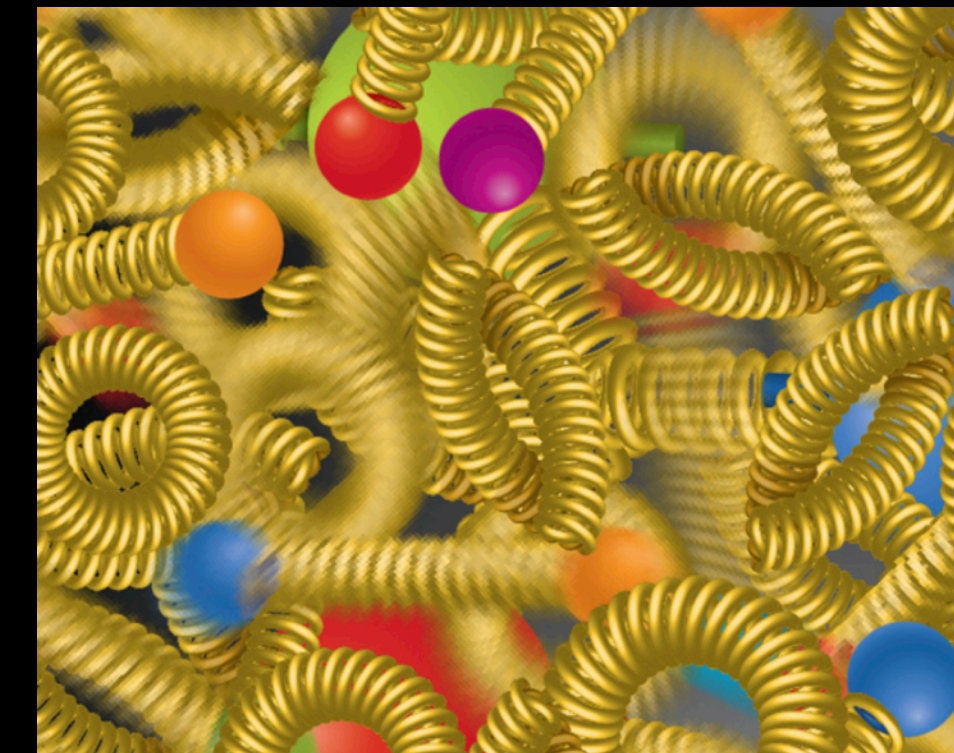
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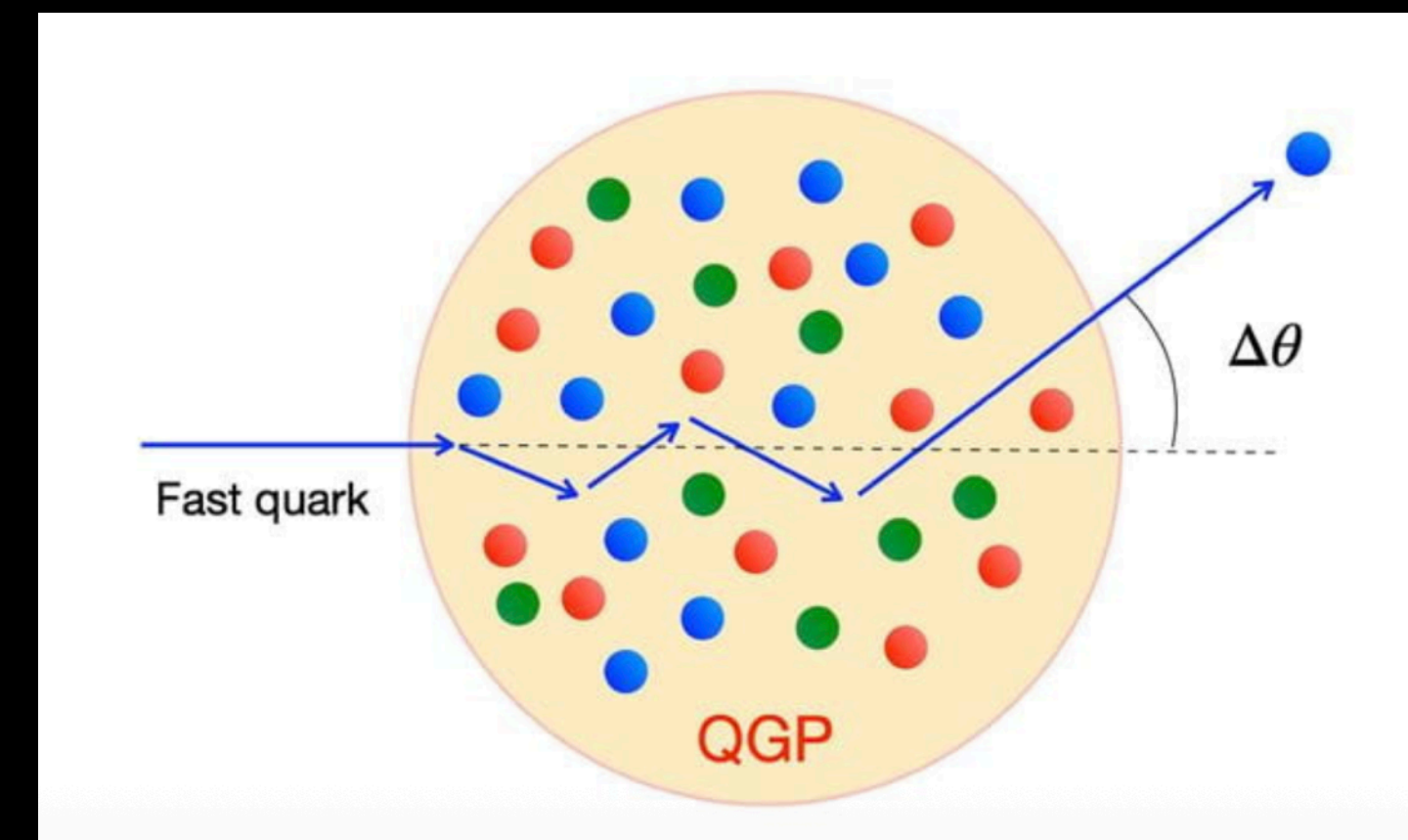
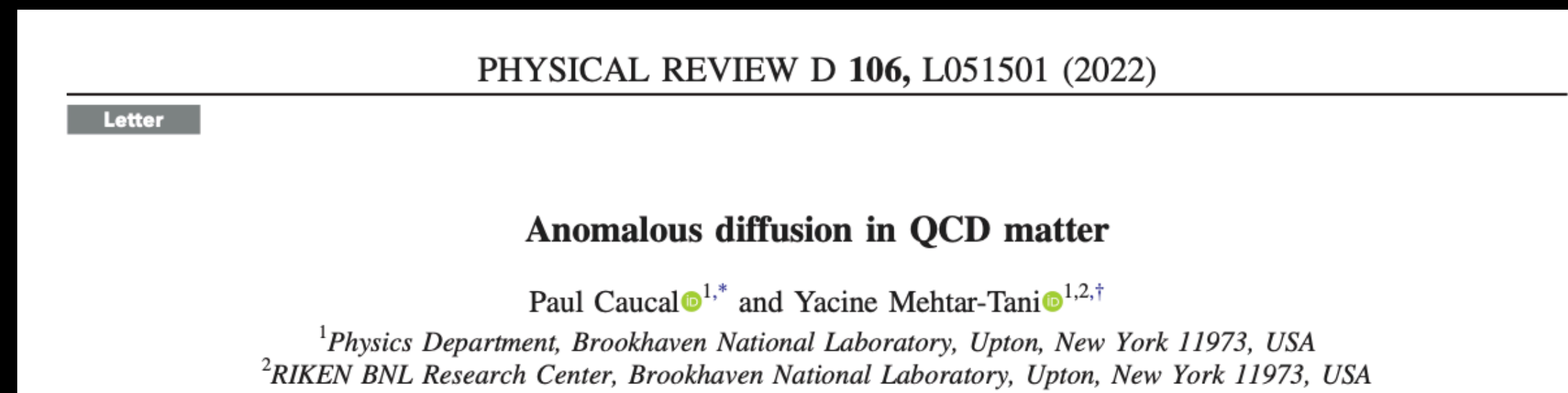


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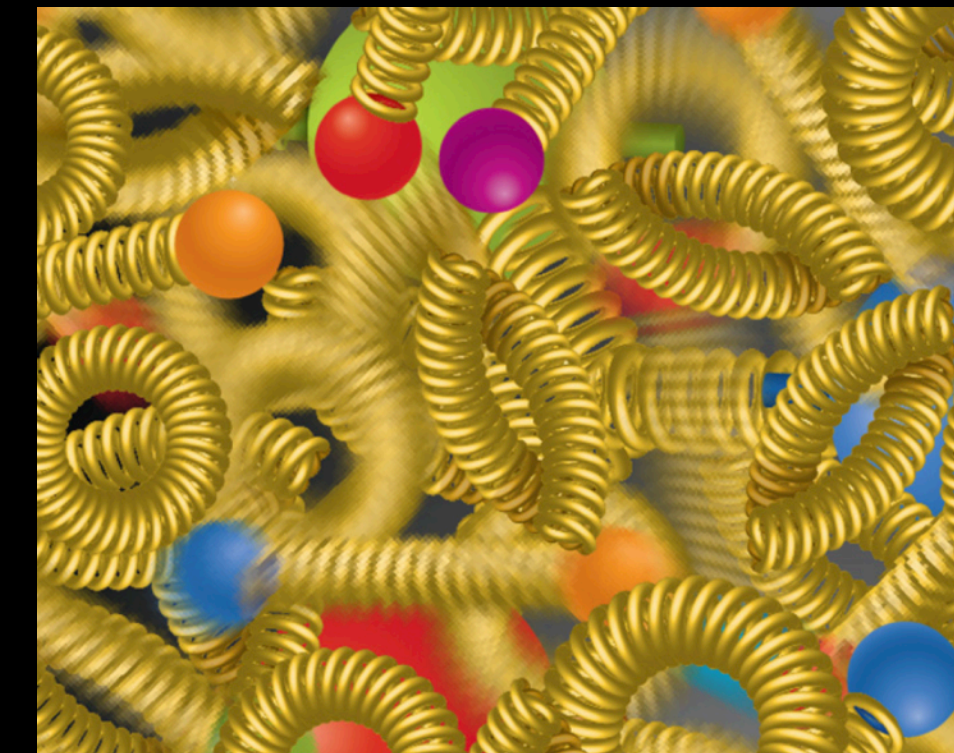


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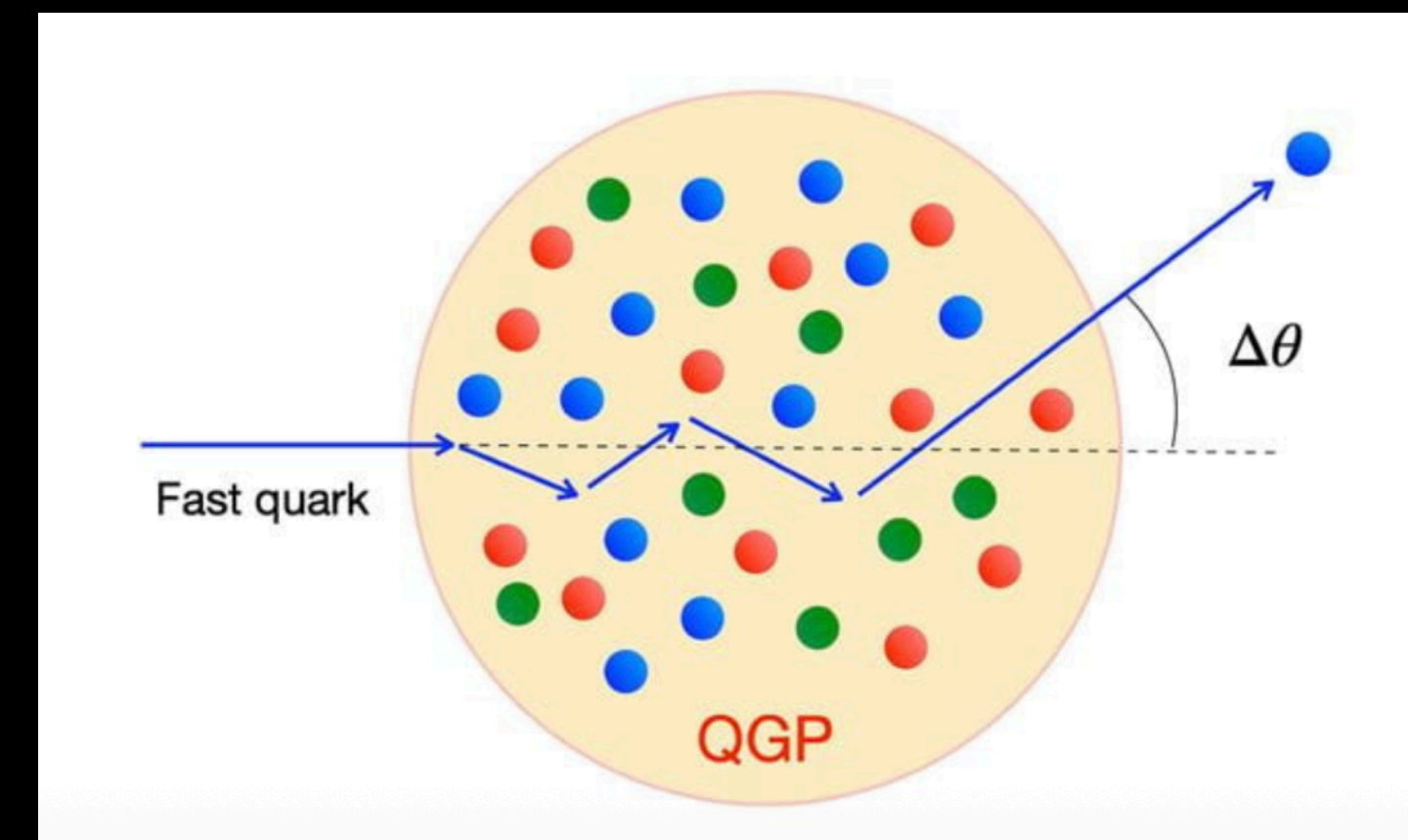
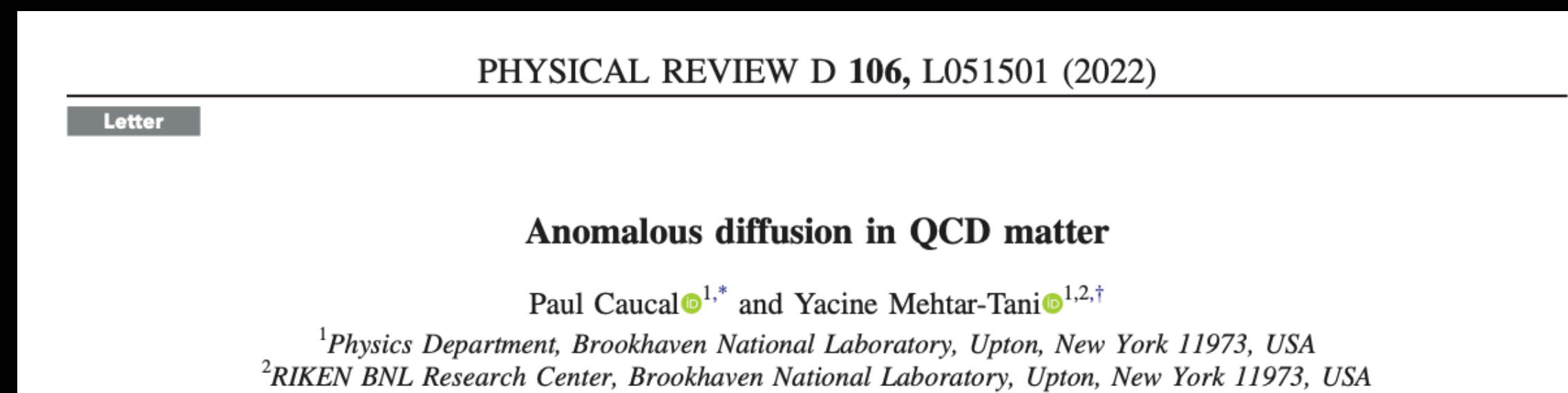


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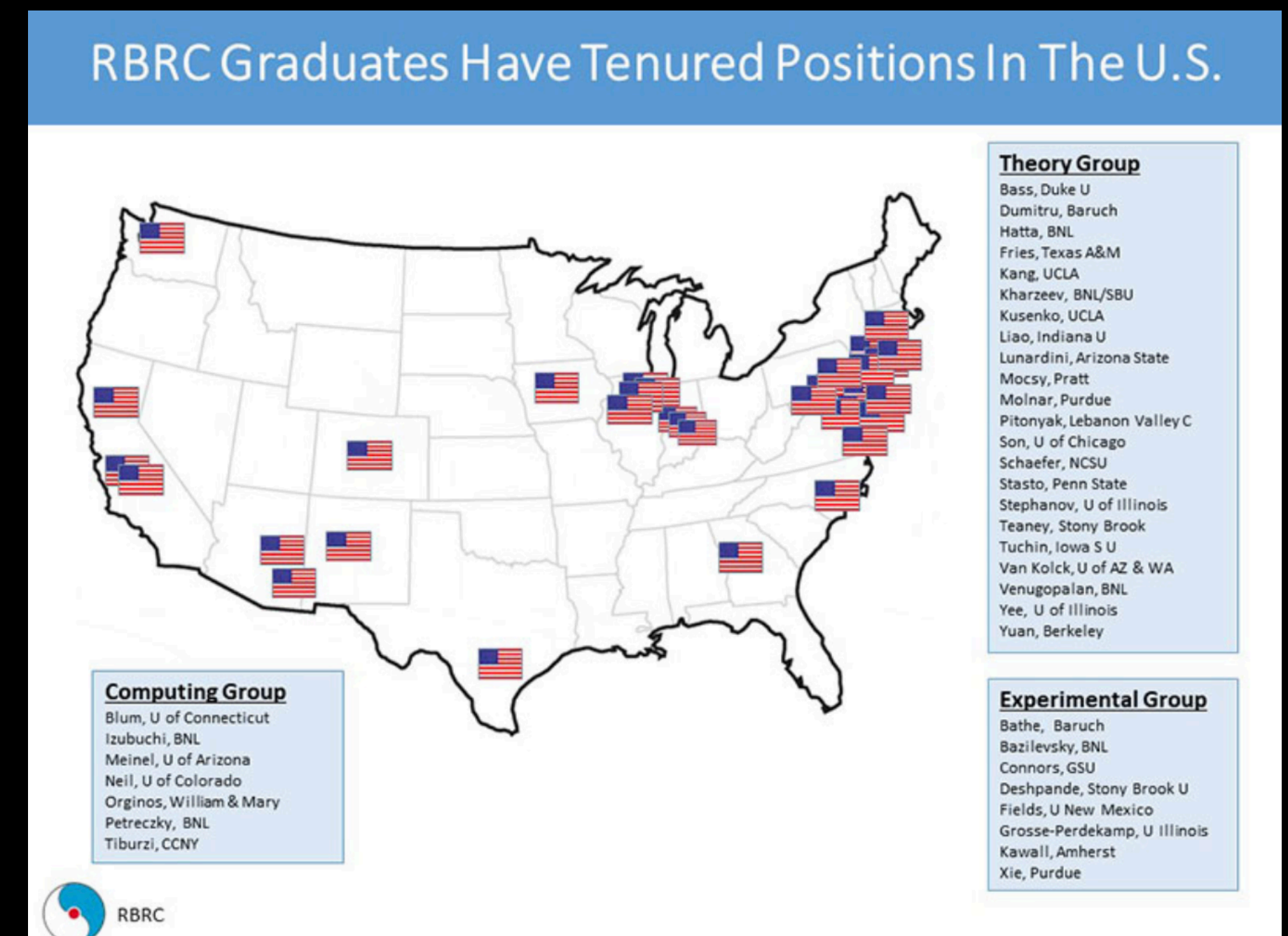
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# Transformative for Early-Career Scientists

- **RBRC provided:**

- Scientific independence
- Long-term collaborations
- Direct integration into the RHIC program
- Leadership opportunities through workshops and initiatives




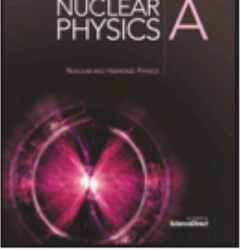
# Many impactful workshops bridging theory and experiment




## Workshop Organizers

- Megan Connors (GSU)
- Yacine Mehtar-Tani (BNL & RBRC)
- Genki Nukazuka (RBRC)
- Dennis Perepelitsa (CU Boulder)
- Anne Sickles (UIUC)

Contents lists available at ScienceDirect

 **Nuclear Physics A** 

journal homepage: [www.elsevier.com/locate/nuclphysa](http://www.elsevier.com/locate/nuclphysa)



### Predictions for the sPHENIX physics program

Ron Belmont<sup>a</sup>, Jasmine Brewer<sup>b</sup>, Quinn Brodsky<sup>c</sup>, Paul Caucal<sup>d</sup>, Megan Connors<sup>e,1</sup>, Magdalena Djordjevic<sup>f</sup>, Raymond Ehlers<sup>g,y,2</sup>, Miguel A. Escobedo<sup>h,i</sup>, Elena G. Ferreira<sup>h</sup>, Giuliano Giacalone<sup>j</sup>, Yoshitaka Hatta<sup>k,l</sup>, Jack Holguin<sup>m</sup>, Weiyao Ke<sup>n</sup>, Zhong-Bo Kang<sup>o</sup>, Amit Kumar<sup>p,2</sup>, Aleksas Mazeliauskas<sup>b,j</sup>, Yacine Mehtar-Tani<sup>k,l,1</sup>, Genki Nukazuka<sup>l,1</sup>, Daniel Pablos<sup>q,r,s</sup>, Dennis V. Perepelitsa<sup>t,\*,1</sup>, Krishna Rajagopal<sup>c</sup>, Anne M. Sickles<sup>u,1</sup>, Michael Strickland<sup>v</sup>, Konrad Tywoniuk<sup>w</sup>, Ivan Vitev<sup>n</sup>, Xin-Nian Wang<sup>y</sup>, Zhong Yang<sup>x</sup>, Fanyi Zhao<sup>o</sup>

# RBRC's Lasting Legacy

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- Helped shape the scientific direction of RHIC physics
- Trained generations of leaders in nuclear theory
- Fostered a unique theory–experiment culture
- ...A successful model to replicate for EIC