

# How To Communicate Materials Science to Public Audiences...

*and to a more inclusive scientific community*



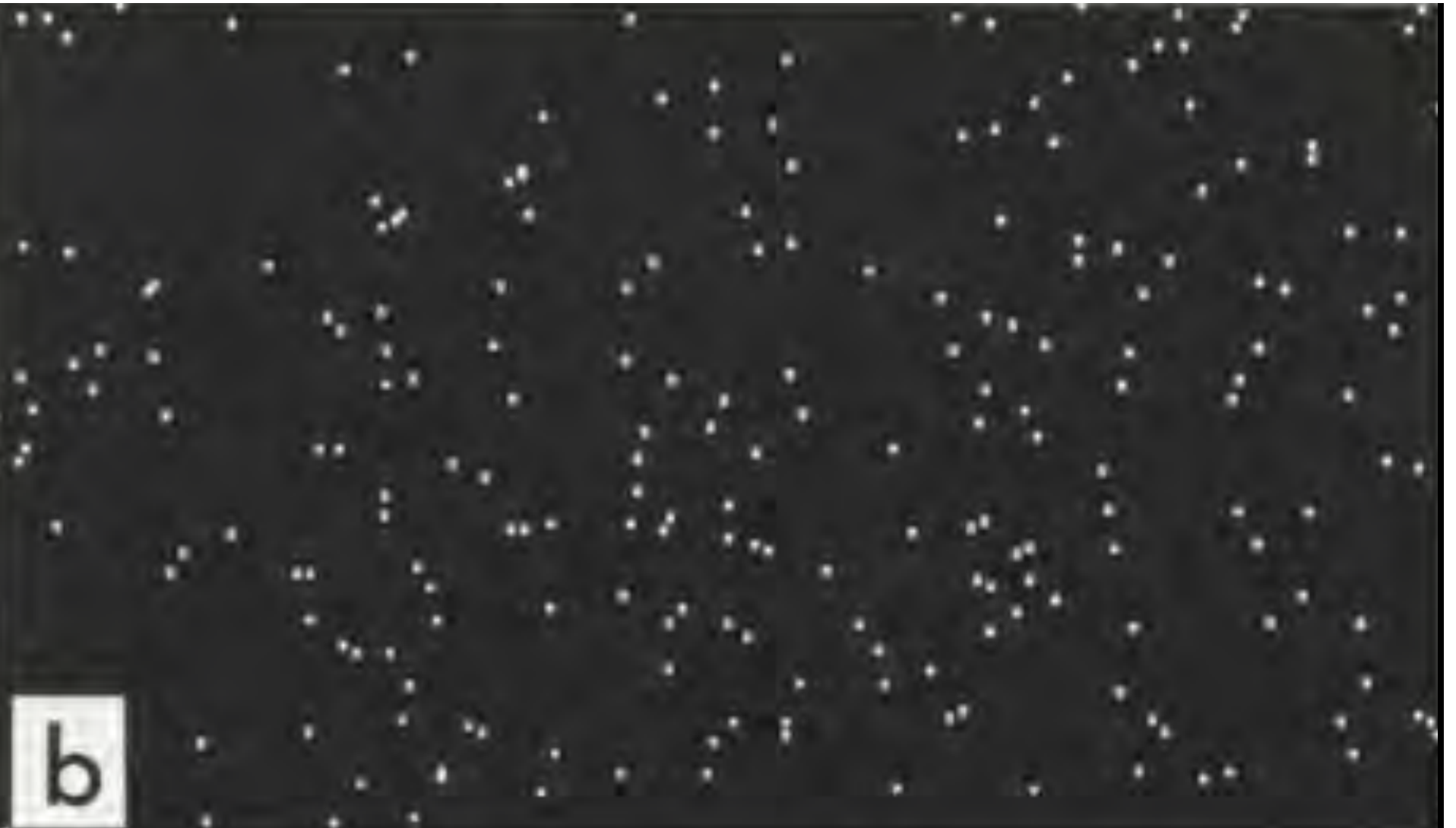
Carol Lynn Alpert

Co-PI, Center for Integrated Quantum Materials, Harvard  
Director, Strategic Projects Group, Museum of Science, Boston

MRSEC Directors Meeting  
National Science Foundation  
October 18, 2016



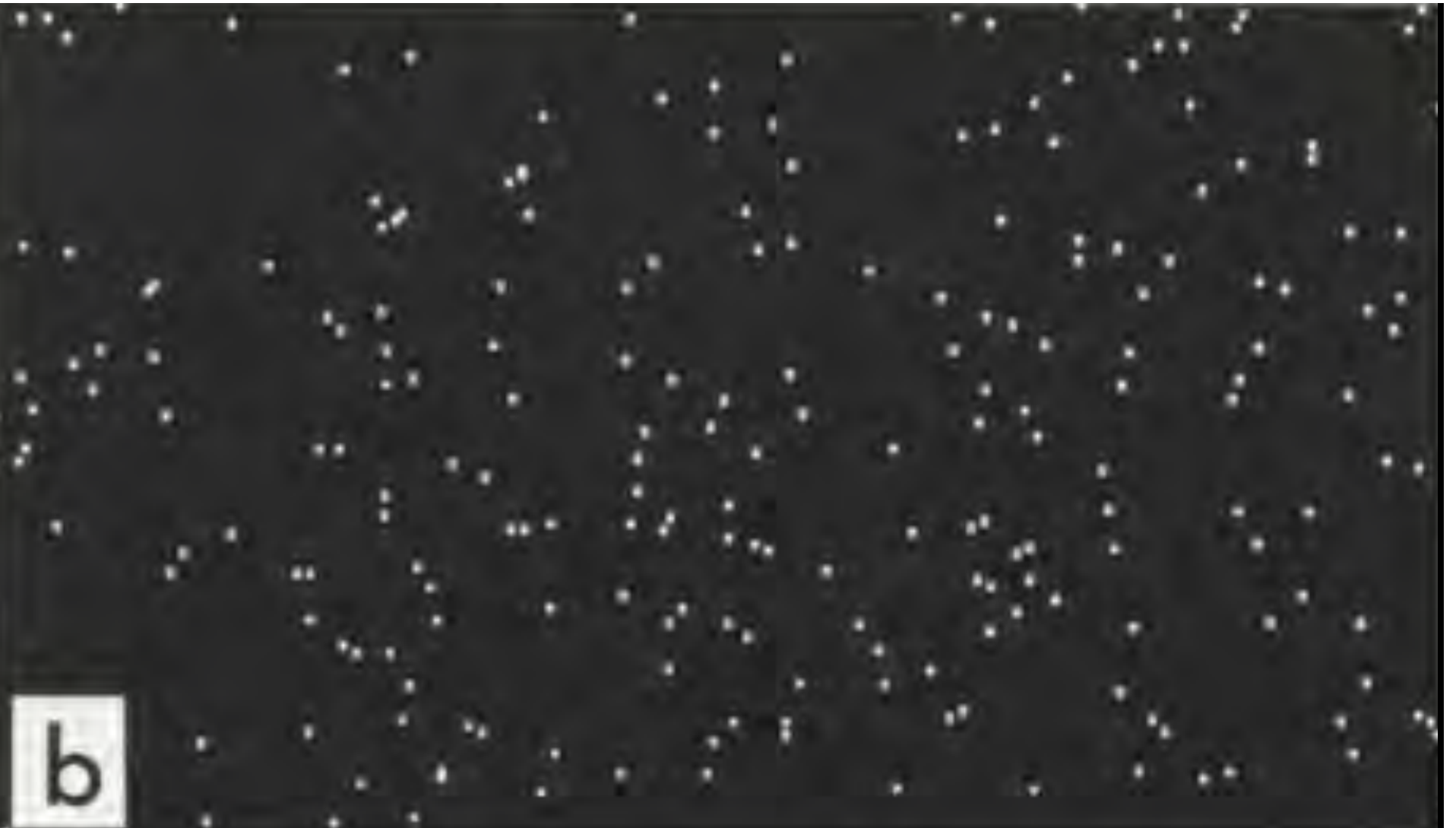




Business



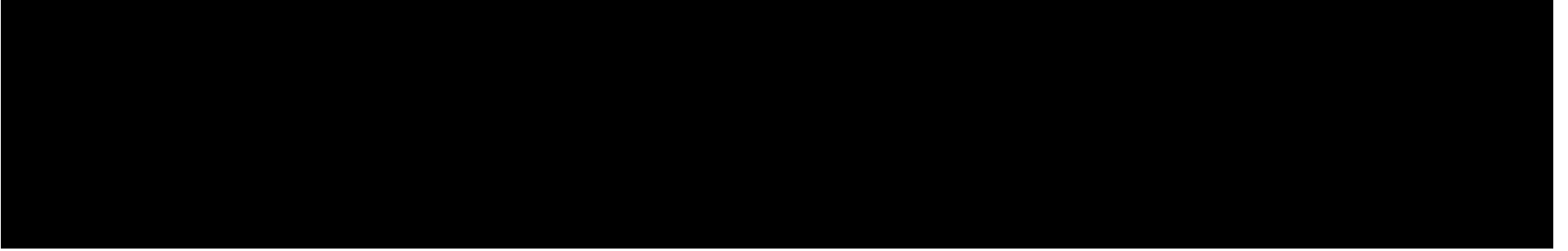
Pleasure?



Business?



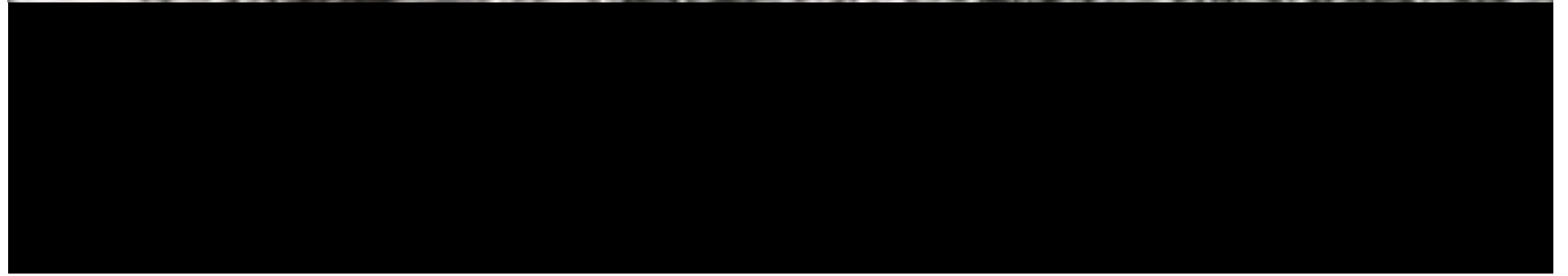
Pleasure?

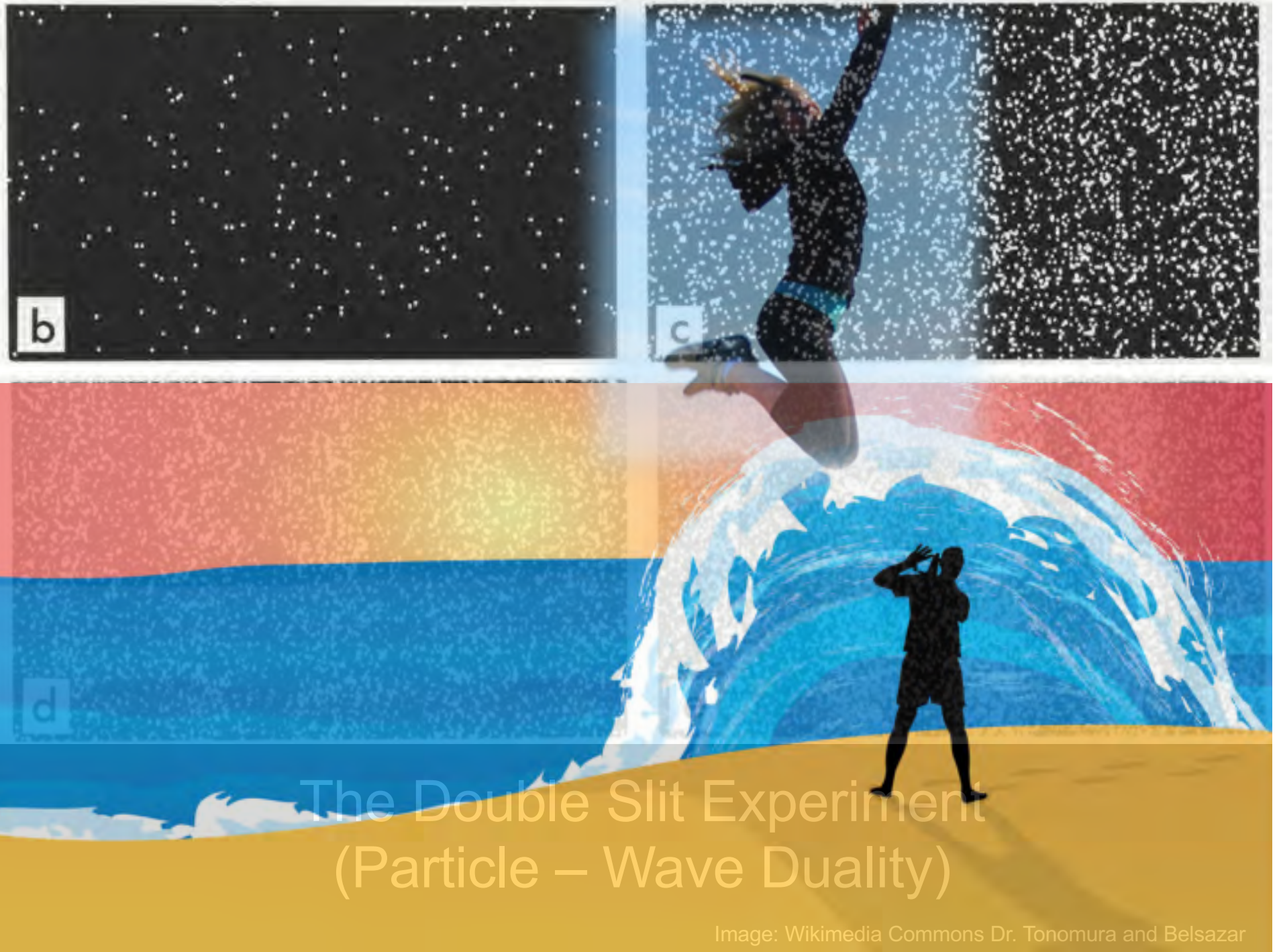




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## The Double Slit Experiment (Particle – Wave Duality)

Image: Wikimedia Commons Dr. Tonomura and Belsazar



***The Amazing Nano Brothers Juggling Show***  
*Seen and enjoyed by over 80,000 people*



# The Future of Computing ...

## *with Quantum Materials*

20,000+ attendees thus far...





# NanoDays™

The Biggest Event for the Smallest Science!

# 2016 April 2nd!



## NanoDays™

The Biggest Event  
for the  
Smallest Science!



**Today! 11:00 a.m. – 3:30 p.m.**

**Imagine, discover, and explore** a world that's too small to see. Investigate the tiny world of nanotechnology with activities and presentations throughout the Museum!

**Highlights include:**

*The Amazing Nano Brothers Juggling Show*  
12:00 p.m. and 2:00 p.m. Cahners Theater

**Special Presentations**

11:30 a.m. *Dazzling Diamond and the Quantum Revolution*

12:30 p.m. *A Brief Intro to Quantum Computing*

1:30 p.m. *From Lab to Fab: Pioneers in Nano-Manufacturing (Film Screening)*

2:30 p.m. *From Chemical Engineer to Cancer Warrior*

Gordon Current Science & Technology Center Stage, Blue Wing, Level 1

**Hands-on Nano Activities**

11:00 a.m. – 3:00 p.m. Blue Wing, Lower Level

Check out **more** nano activities in the *Butterfly Garden*, *Hall of Human Life*, and *Suit/Cabot Lab*.



5,500 visitors

56 grad students

18 industry reps

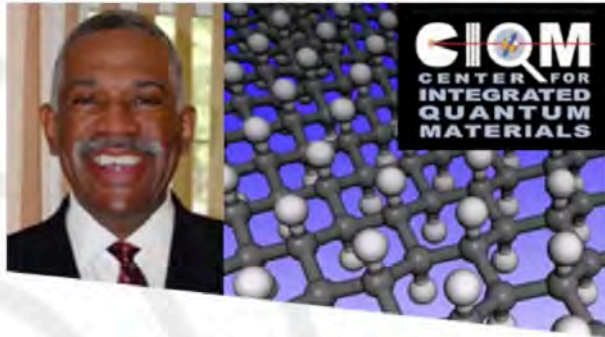


# CIQM PI Bob Westervelt, onstage at the Museum



New Quantum Materials for Atomic-Scale Electronics





### Amazing Two-Dimensional Materials

Dr. Steven Richardson from Howard University describes the intriguing properties of 2D atomic layers and their potential for the future.

NANO PODCAST | Nov 12, 2015 | Museum of Science

# CIQM media online

NanoNerds YouTube Channel: 1,600 subscribers.  
Podcasts also on the iTunes: 5,000 subscribers.



#### Center for Integrated Quantum Materials (CIQM)

Featuring research from the Center for Integrated Quantum Materials (CIQM) based at Harvard University, Howard University, MIT, and the Museum of Science.

<p><b>Podcast: Amazing Two-Dimensional Materials</b> by NanoNerds 62 views · 2 months ago</p>	<p><b>The Future of Computing... with Quantum Materials - Karine Thate</b> by NanoNerds 274 views · 7 months ago</p>	<p><b>Diamond - An Engineer's Best Friend - Marko Loncar</b> by NanoNerds 299 views · 7 months ago</p>	<p><b>NanoDays Podcast: Engineering with Diamonds</b> by NanoNerds 139 views · 9 months ago</p>
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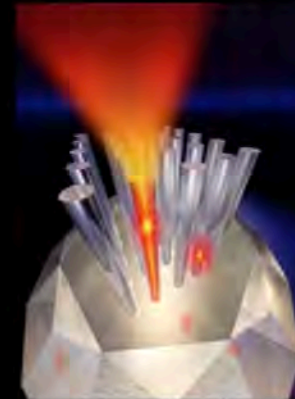


### NanoDays Podcast: Engineering with Diamonds

Marko Loncar, Harvard professor and member of the NSF Center for Integrated Quantum Materials (CIQM), describes some of the amazing properties of diamonds that make them an engineer's best friend.

NANO PODCAST | Apr 4, 2015 | Museum of Science

## an Engineer's Diamond - A Girl's Best Friend



**Marko Lončar**  
School of Engineering and Applied Sciences  
Harvard University

# Annual Meeting



## Research Communication Challenge



# Judging Rubric

## **1. Clarity of Motivation & Significance**

Presenter orients the audience to the broader context and motivation for the research and clarifies its potential significance.

# Judging Rubric

## **2. Speaking Style & Delivery**

Presenter exhibits poise;  
tells a clear and compelling story  
without excessive jargon;  
makes eye contact; projects voice

# Judging Rubric

## **3. Slides & Graphics**

Visual information syncs with talk,  
illuminates key concepts, enhances meaning.  
Information on slides is visible to all.

# Research Communication Challenge App



# Seven-point scale for each criterion

C. L. Alpert

Clarity of Motivation & Significance

S ✓ ---

- 1 - Little effort apparent
- 2 - Not that good
- 3 - Some good aspects
- 4 - Mostly good
- 5 - Very good
- 6 - Excellent
- 7 - Outstanding

Type here

# Polling App: swift, secure, confidential – works on laptops, tablets, and phones

C. L. Alpert

Clarity of Motivation & Significance

--

Speaking Style & Delivery

--

Slides & Graphics

---

Comments (optional)

Type here



# Workshops & Coaching Sessions

Offered at each of the 3 universities in the two weeks before the Annual Meeting.



Howard



Harvard



MIT

# CIQM First Annual Meeting September 2014



8 faculty judges + audience choice

Participation: 90%



735 complete ratings across  
all 24 presenters

Industry attendees participated too



Winners received cash prizes from MOS  
and certificates from center director



# Statistical Analysis



Dr. Lubella Lenaburg



## Second Annual Meeting – October 2015



2<sup>nd</sup> Implementation of  
Research Communication Challenge

# Workshops & Coaching Sessions

Offered at each of the 3 universities in the two weeks before the Annual Meeting.



Howard



Harvard



MIT





Videotape each talk for confidential  
distribution to students



# Research Communication Challenge Winners 2015





# Comments on the Research Communication Challenge

(from comment area of scoring app)

- The talks were much better this year!
- Very engaging and enjoyable.
- The app was very easy to use.
- There was a very noticeable difference in the quality of the talks this year... the coaching made a big impact.
- The talks were of a uniformly high calibre.
- I know the students greatly benefited from this experience.
- I really like this format for rapid topics and presentation challenge for young students and post docs. It is entertaining and educational.

# Comments from **Faculty** Focus Groups

Conducted by independent evaluator

Dr. Lubella Lenaburg, October 2015

Faculty feel the [presentation training and Research Communication Challenge] are among the top CIQM activities that are beneficial for students and postdocs.

Knowing how to give a five-minute talk is a valuable skill, and the opportunity to judge the presentations is a great experience.

# Comments from **Graduate Student** Focus Groups

Conducted by independent evaluator

Dr. Lubella Lenaburg, October 2015

Graduate students appreciated the opportunity to practice their presentation skills, and report that the Museum of Science training is one of the only opportunities they have to do this...

They gained confidence and benefited from the encouragement, and this was also noticed by faculty. Winners felt good, and all students got useful feedback. While their videos were hard to watch, they found it valuable to watch themselves give their presentation.

# Comments from **Post-Doc** Focus Group

Conducted by independent evaluator

Dr. Lubella Lenaburg, October 2015

Postdocs who speak English as a second language thought the coaching sessions were very useful for practicing their delivery.

## *Overall impact of the* Research Communication Challenge

- Increased effectiveness of Annual Meeting as an arena for cross-disciplinary communication and collaboration.
- Increased the education value of the meeting for students and post-docs.
- Is it transferable to other Centers?





*First Knowledge Transfer - Proof-of-Concept*

center for  
**excitonics** 2015 All-Hands Meeting

Center Director & Center Manager:

*“[We] agree that this was by far the best  
All-Hands meeting we’ve had to date...  
.... the competition increased the quality  
of the talks and kept us on schedule.”*

# Poster Presentation & “Elevator Speech” Workshops during the Intern Convocation



*“Introducing  
Yourself and  
Your Work”*  
Workshop  
for CIQM  
undergraduate  
interns





# Research Poster Summer Olympics!

# “Significant improvement in confidence and communication skills”

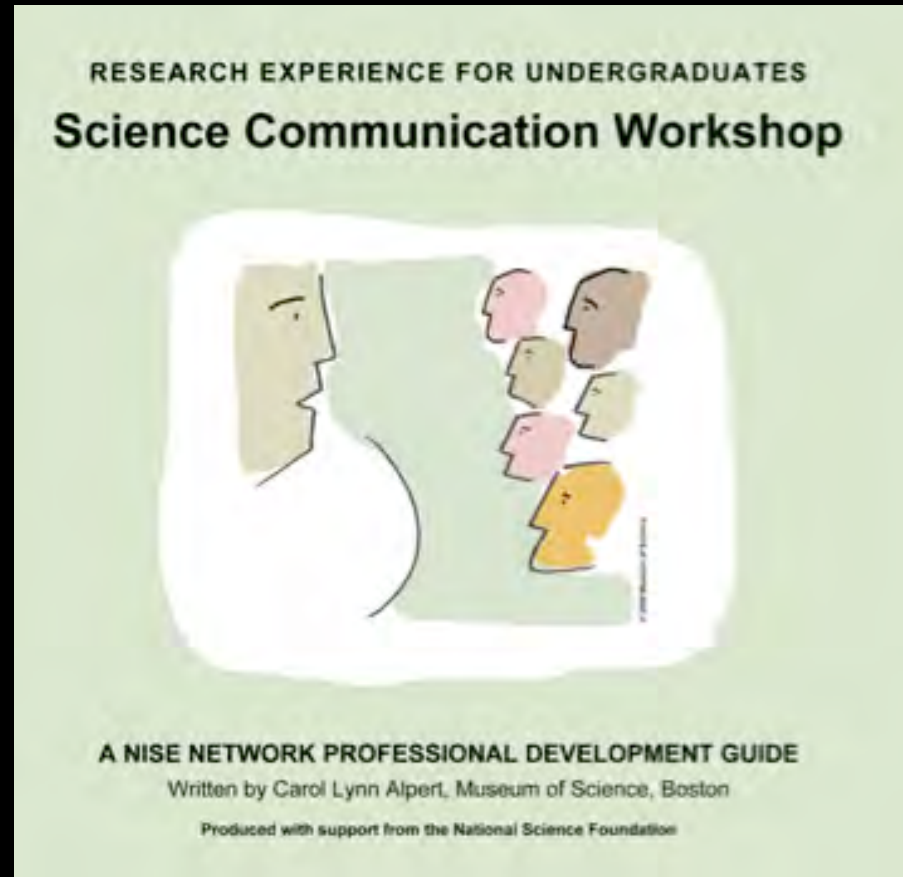
- UMass Donahue Institute for Research and Evaluation



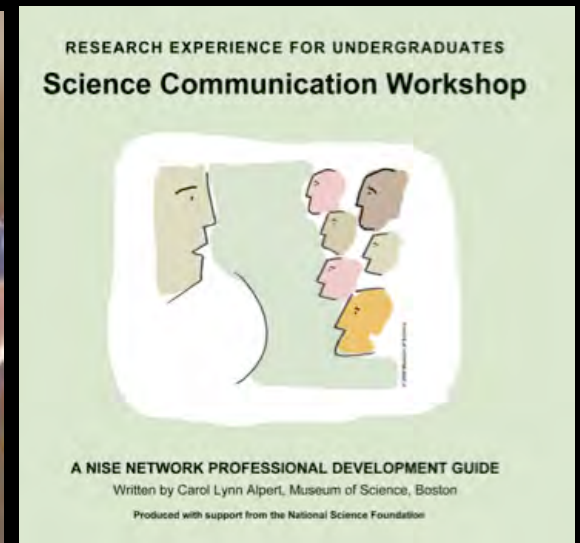
“I wish all the professors and research people would take part in such a workshop. It makes you aware that no matter how great your results are, they don't mean anything if you can't communicate them to others.”

- Student participant

# Implementation guide and materials free on [nisenet.org](http://nisenet.org)



# Sci-Comm Scale-Up: 10 Universities



## MRS EDUCATION SYMPOSIA:

C.L. Alpert, K. Thate, **Can a Nat. Network of Undergrad. Research Prog. Directors Validate a Set of Prof. Skills-Building Sci. Comm. Wkshps?** *MRS Online Proc. Library* (2014).

C. L. Alpert, **Beyond 'Train-the-Trainer:' A Preliminary Report on a New Scaffolding Strategy for Science Communication Workshop Dissemination,** *MRS Online Proc. Library* 1532 (2013).

C. L. Alpert, E. Levine, C. Barry, J. Isaacs, A. Fiorentino, K. Hollar, K. Thate, **Tackling Science Communication with REU Students: A Formative Evaluation of a Collaborative Approach,** *Mater. Education*, eds. M. Marinho Patterson, D. Dunham, E. Marshall, J. Nucci (*Mater. Res. Soc. Symp. Proc.* 1234 (2009)).





Thank you

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