

Title: Clifford Johnson: University of Southern California

Date: Feb 06, 2019 07:00 PM

URL: <http://pirsa.org/19020049>

Abstract:

Clifford V. Johnson is a theoretical physicist passionate about sharing science with the public. He resolved to write a book explaining physics to a lay audience, but he felt that words on a printed page did not fully convey the dynamic, collaborative nature of fundamental research.

What if, he wondered, you could represent multiple voices and points of view? What if one could make the reader feel immersed in scientific discourse, rather than reading the words of an expert sharing a single perspective?

He wanted to write a book that would give readers a fly-on-the-wall experience of the process of fundamental science.

Johnson realized that graphic novels are the unique narrative medium he was searching for. Through the written word and compelling visuals, graphic novels immerse the reader in a sensory world of ideas.

This realization led Johnson to write and draw *The Dialogues: Conversations About the Nature of the Universe* (MIT Press), which allows readers to eavesdrop on a series of dialogues, set in locations around the world, about cutting-edge scientific topics.

In this public lecture, Johnson will discuss the process of turning complex scientific topics into compelling visual narratives.

Tonight's Public Lecture

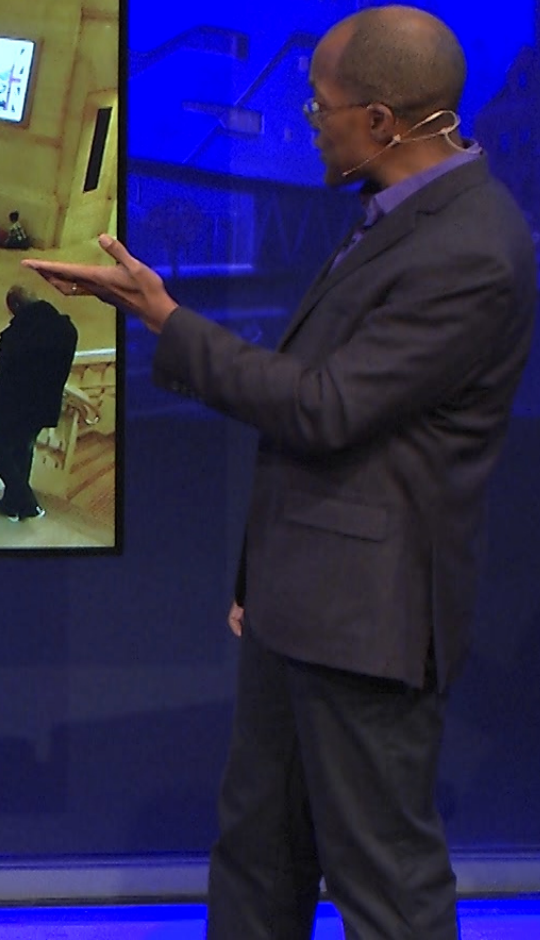
Clifford Johnson Graphic Talk about the Universe

February 7, 2018



PUBLIC LECTURE SERIES



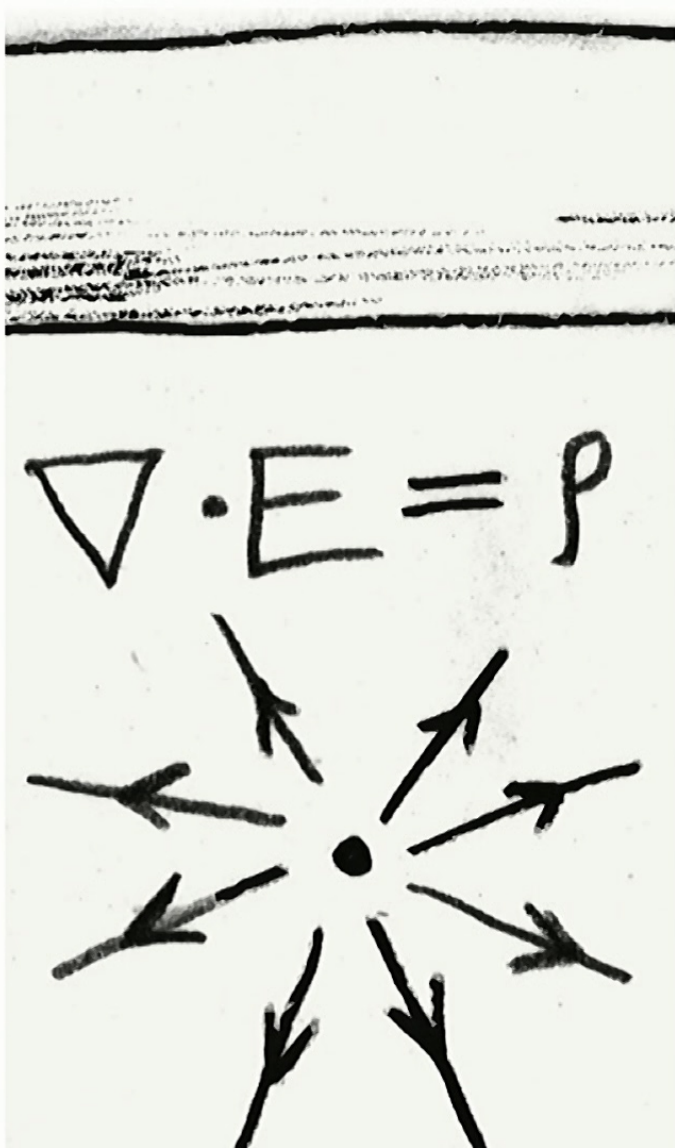


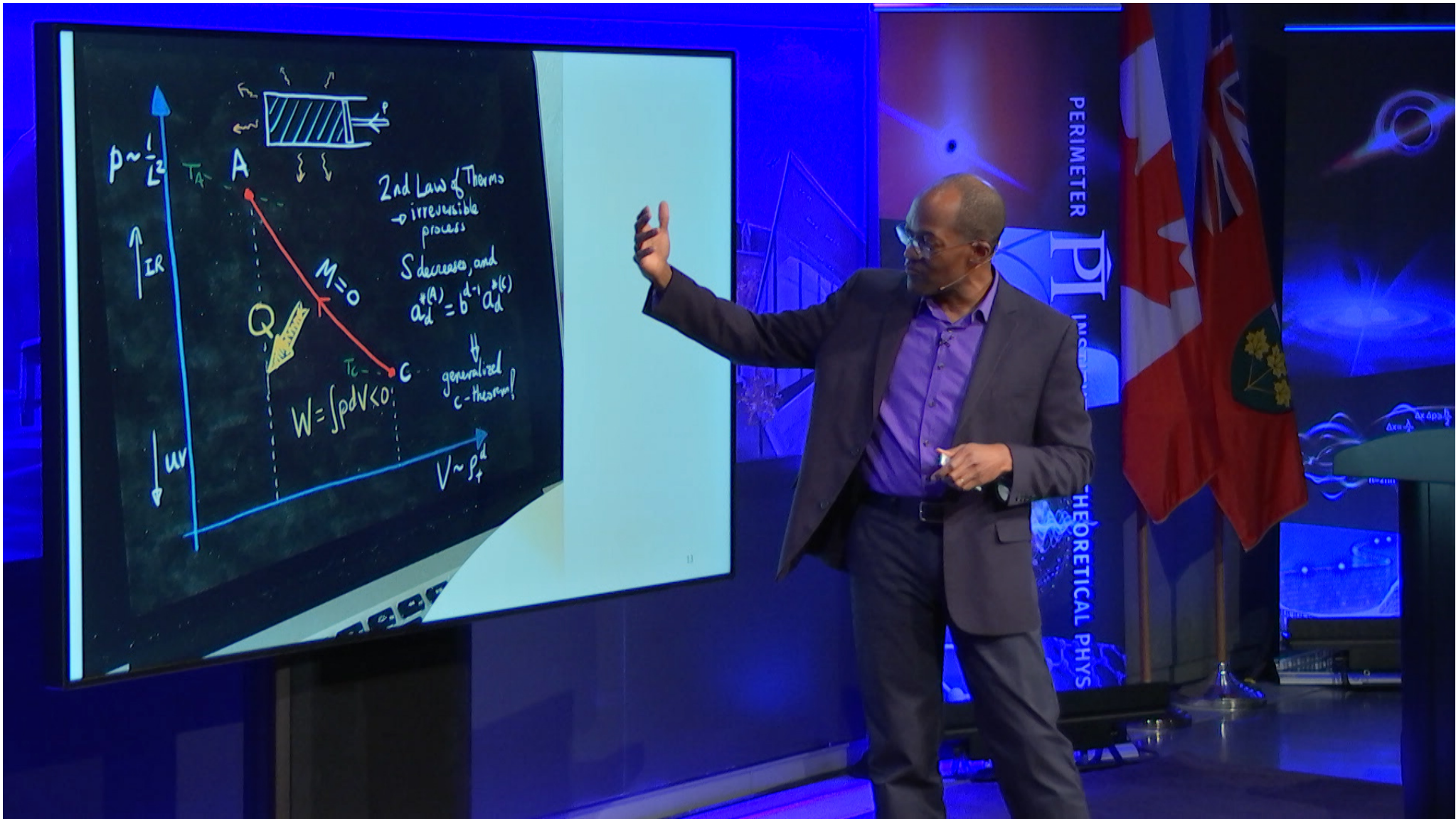


Stills from History Channel's
"The Universe" S5 E4 (2010)











pictures

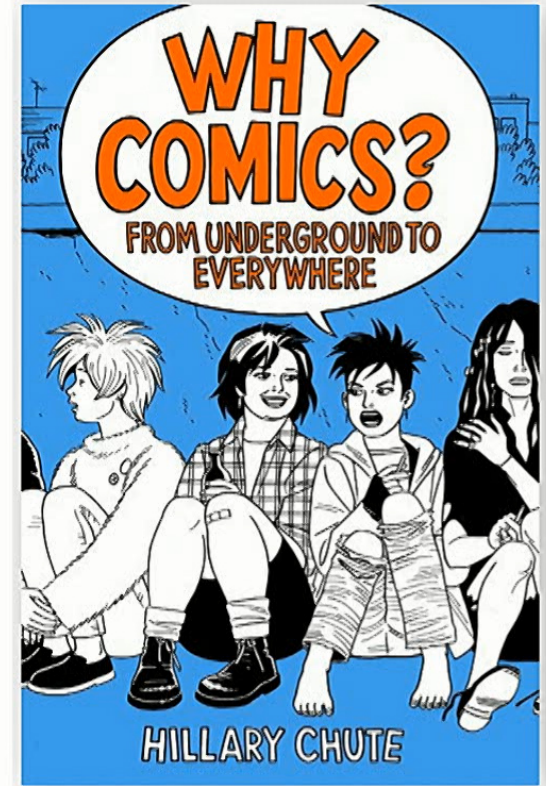
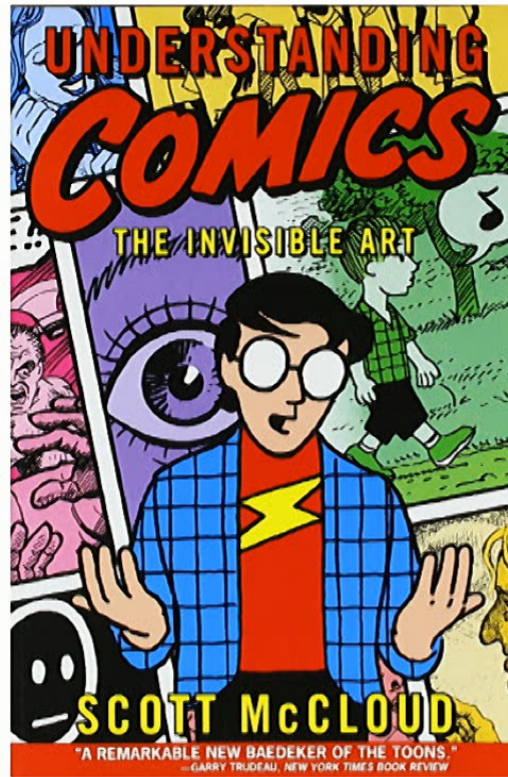
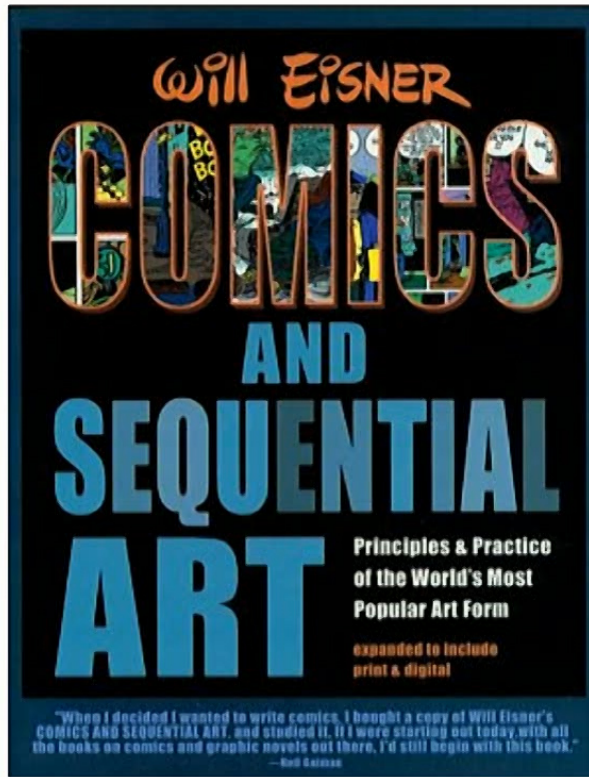
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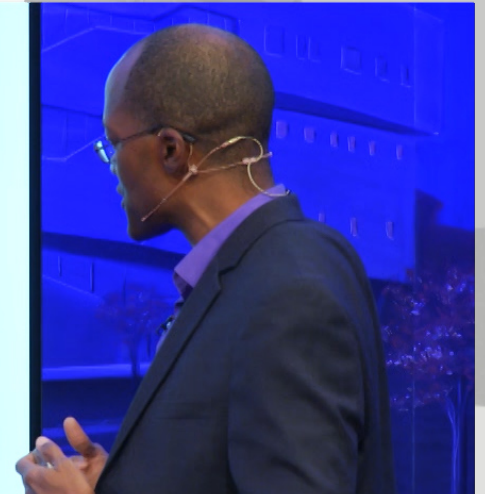
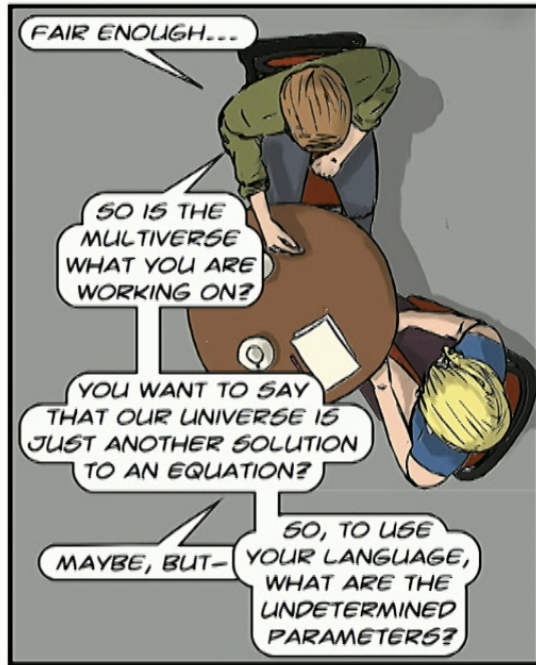
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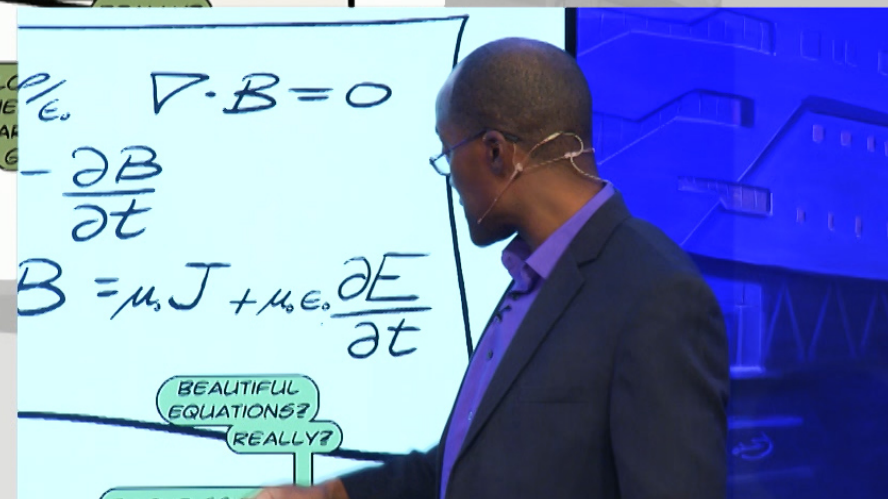
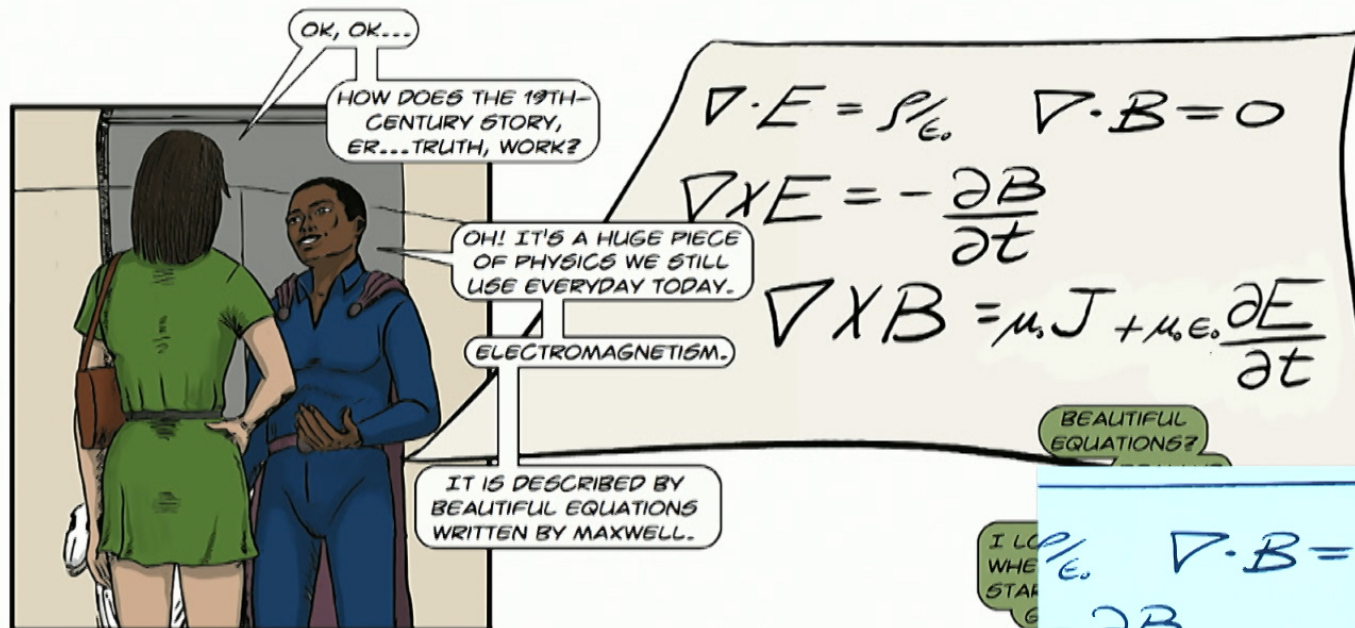
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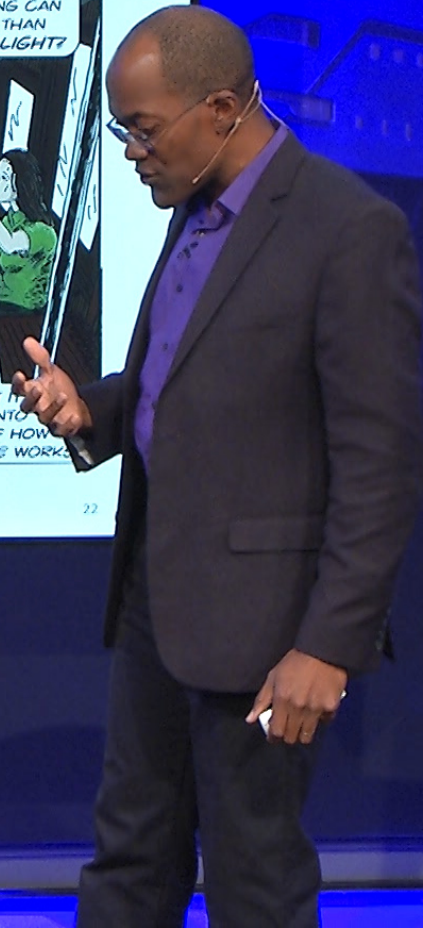
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pictures

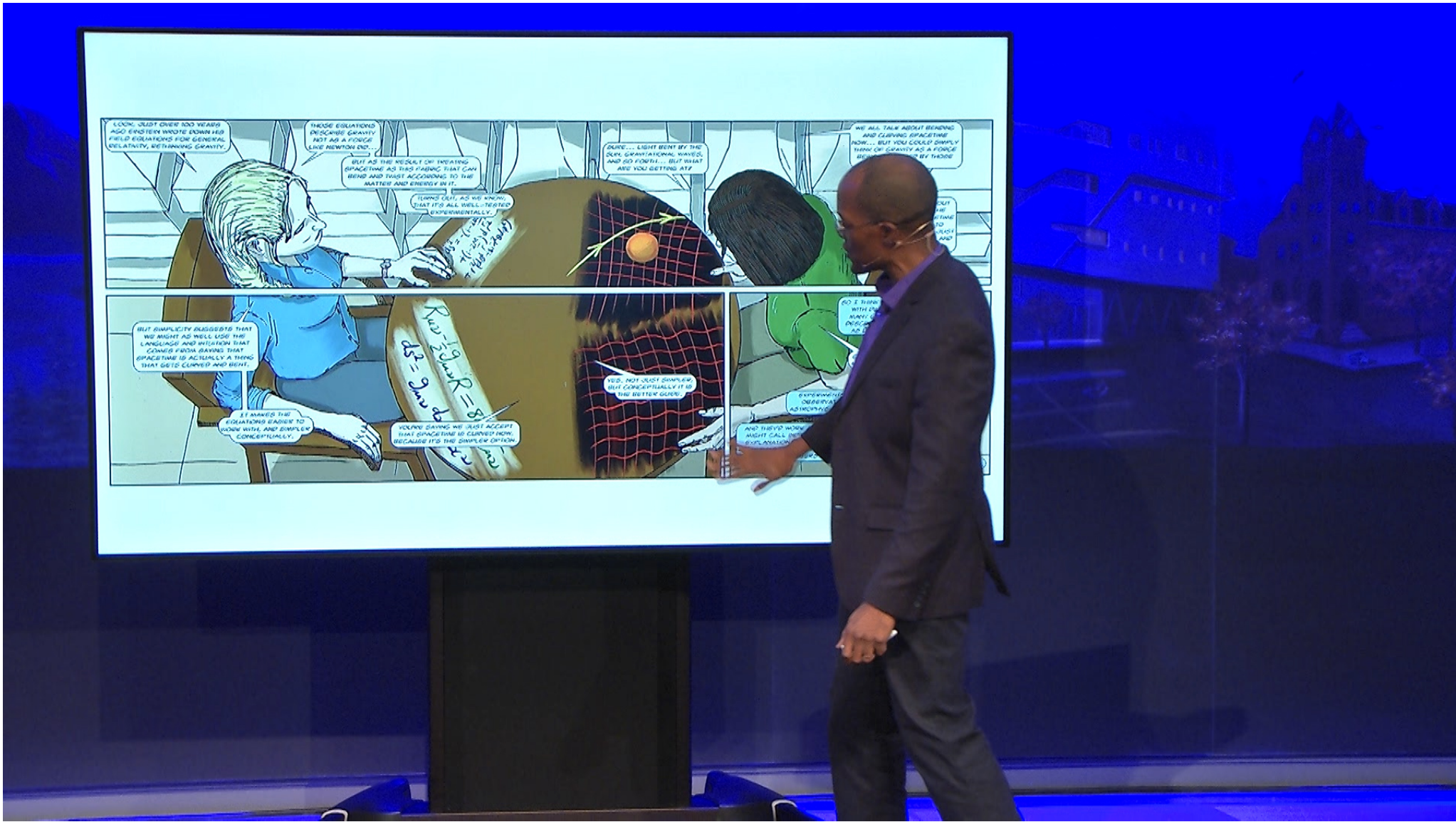
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LOOK, JUST OVER 100 YEARS AGO EINSTEIN WROTE DOWN HIS FIELD EQUATIONS FOR GENERAL RELATIVITY, REFINANCING GRAVITY.

THOSE EQUATIONS ENCODED GRAVITY NOT AS A FORCE LIKE NEWTON DID...

BUT AS THE RESULT OF TREATING SPACETIME AS THIS FABRIC THAT CAN BEND AND TWIST ACCORDING TO THE MATTER AND ENERGY IN IT.

THOSE DAYS, AS WE KNOW, THAT IS ALL WELL-TESTED EXPERIMENTALLY.

SURE... LIGHT BENT BY THE SUN, GRAVITATIONAL WAVES, AND SO FORTH... BUT WHAT ARE YOU GETTING AT?

WE ALL TALK ABOUT BENDING AND CURVING SPACETIME NOW... BUT YOU COULD SIMPLY THINK OF GRAVITY AS A FORCE RESULTING FROM THOSE

DO I THINK WITH ALL THESE PAGES AS

YEP, NOT JUST SIMPLY BUT CONCEPTUALLY IT IS THE BETTER SCENE.

EXPERIMENTAL OBSERVATIONS AS MENTIONED

AND THEIR WORK MIGHT CALL FOR EXPLANATION

BUT SIMPLY DECIDED THAT WE MIGHT AS WELL USE THE LANGUAGE AND IMAGERY THAT COMES WITH SAYING THAT SPACETIME IS ACTUALLY A THING THAT GETS CURVED AND BENT.

I MOVED THE EQUATIONS AROUND TO LOOK WITH AN EYE FOR CONCEPTUALITY.

YOU'RE SAYING WE JUST ACCEPT THAT SPACETIME IS CURVED NOW BECAUSE IT'S THE SIMPLER OPTION.

$R_{\mu\nu} - \frac{1}{2}g_{\mu\nu}R = 8\pi G T_{\mu\nu}$

$g_{\mu\nu}$

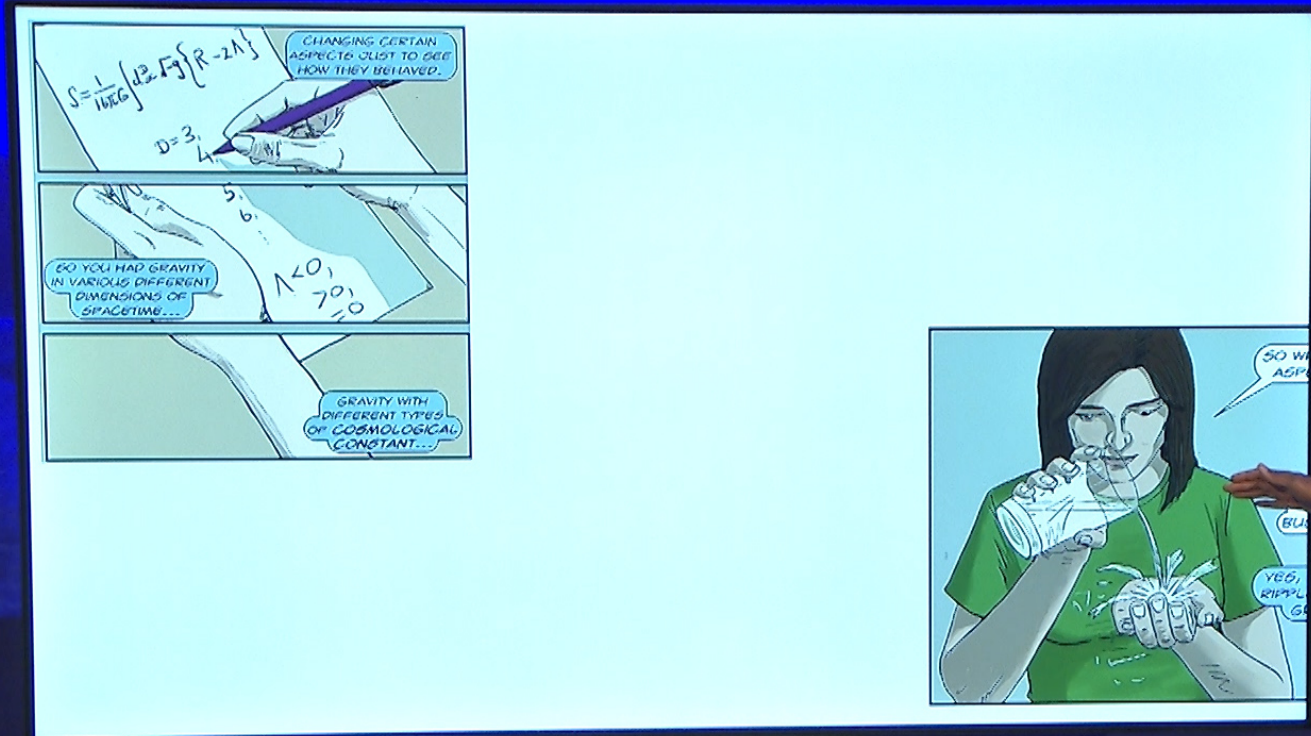
$T_{\mu\nu}$

$R_{\mu\nu}$

R

$g_{\mu\nu}$

$T_{\mu\nu}$

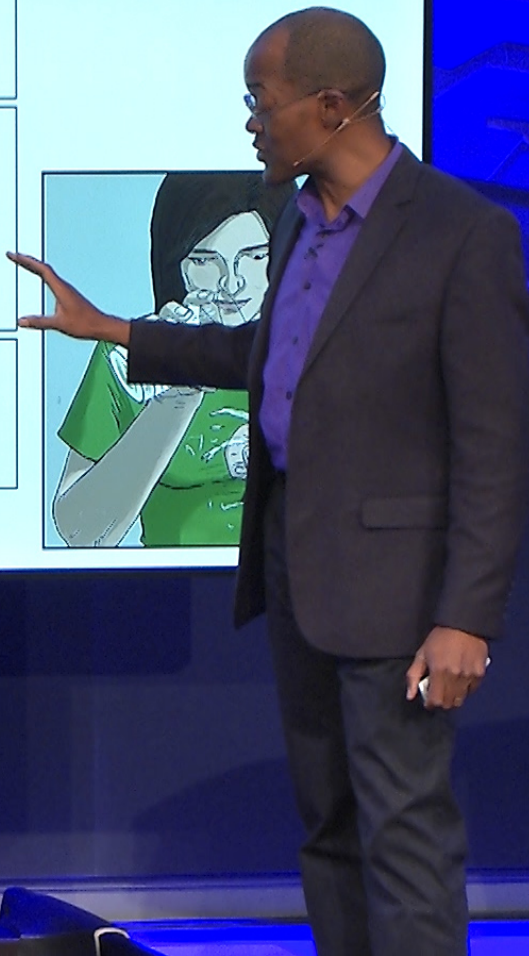


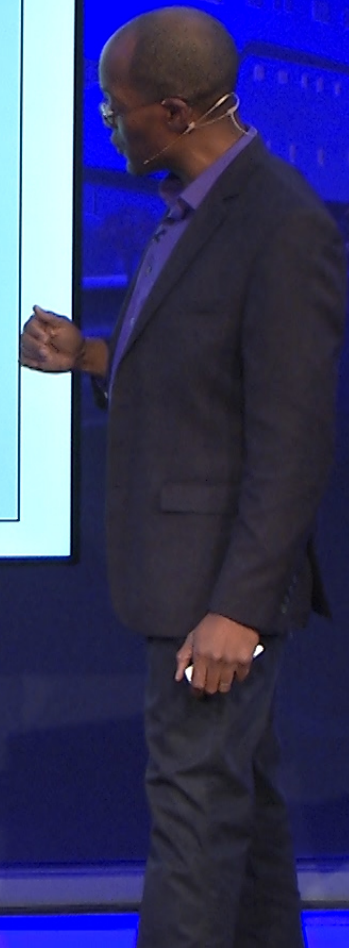
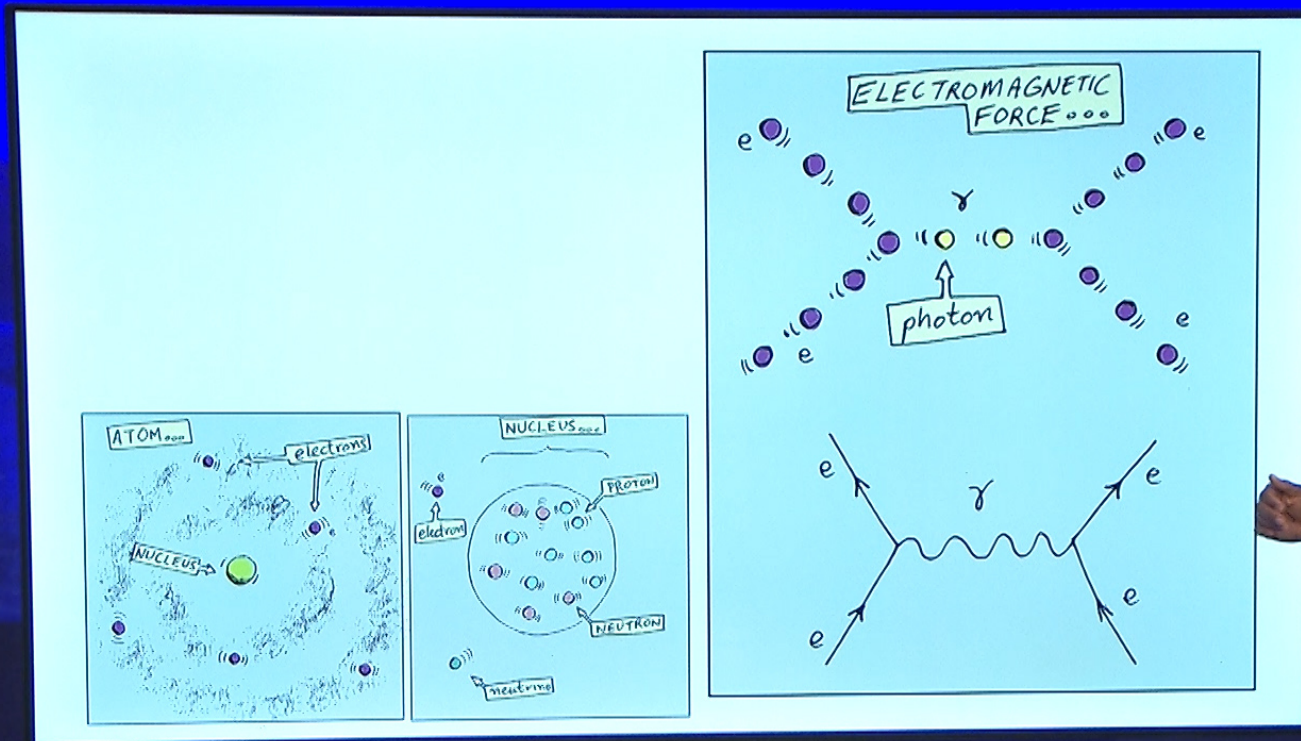
$S = \frac{1}{16\pi G} \int d^D x \sqrt{|g|} (R - 2\Lambda)$
 $D=3, 4$

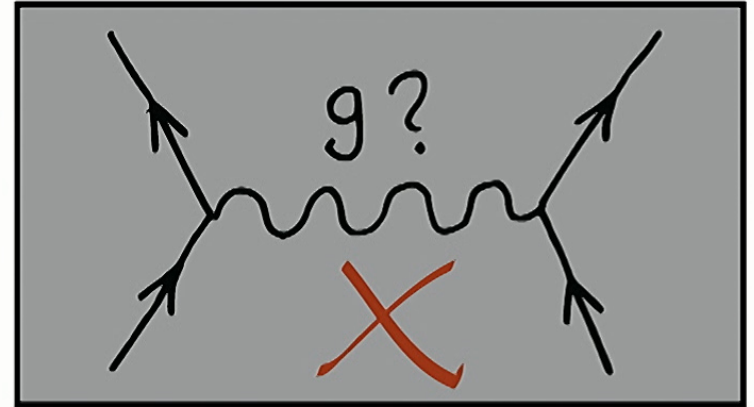
CHANGING CERTAIN ASPECTS OUST TO SEE HOW THEY BEHAVED.

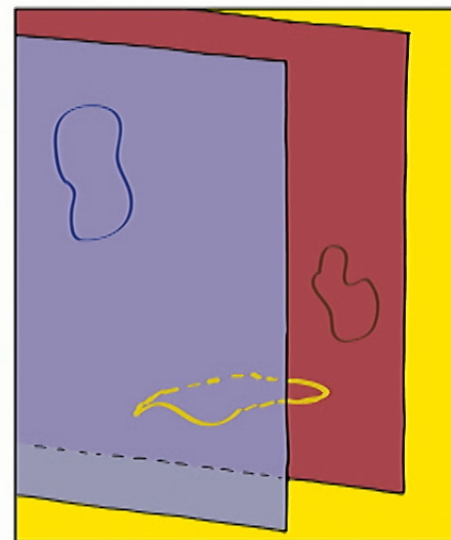
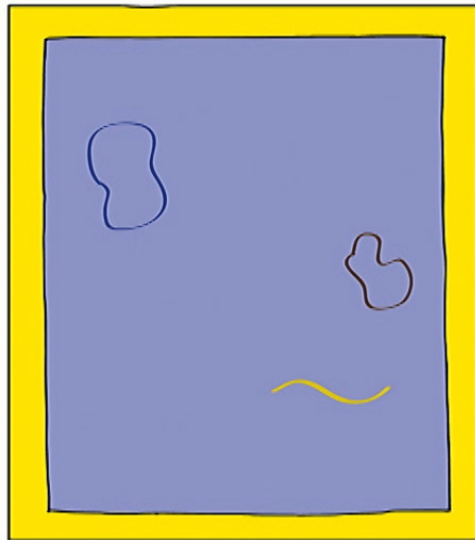
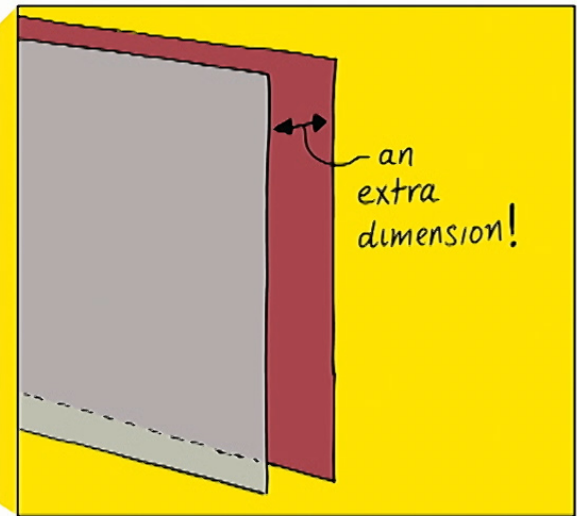
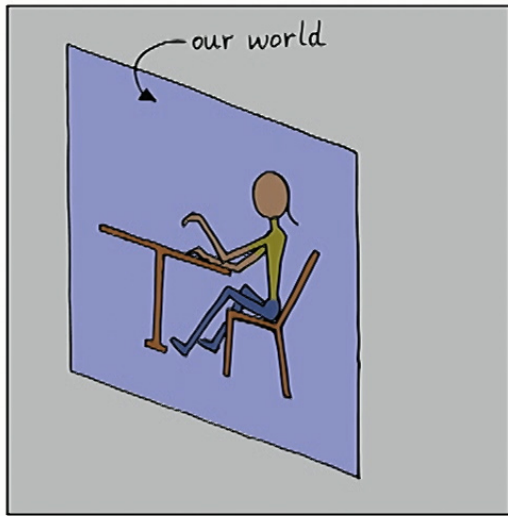
DO YOU HAD GRAVITY IN VARIOUS DIFFERENT DIMENSIONS OF SPACETIME...

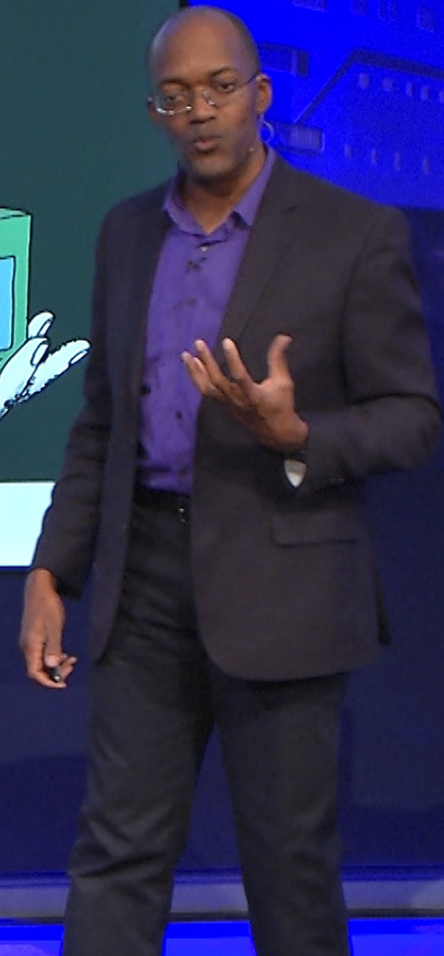
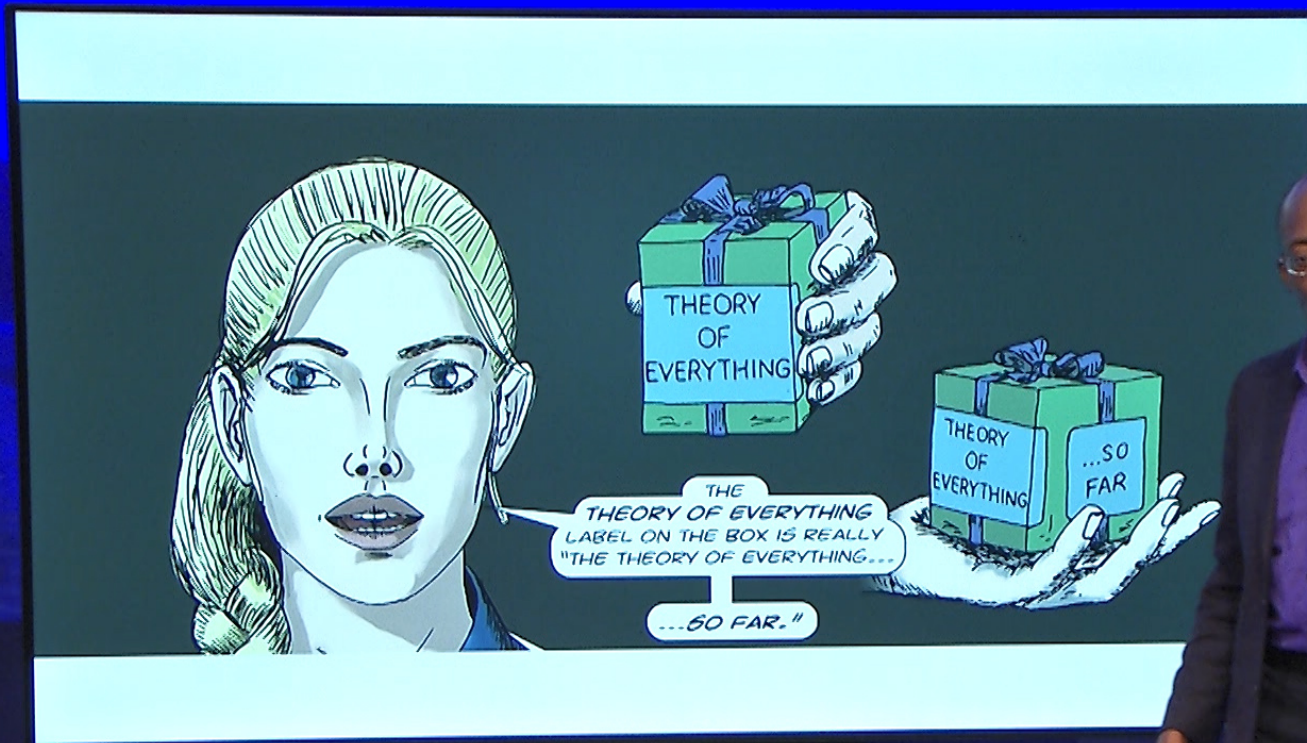
GRAVITY WITH DIFFERENT TYPES OF COSMOLOGICAL CONSTANT...

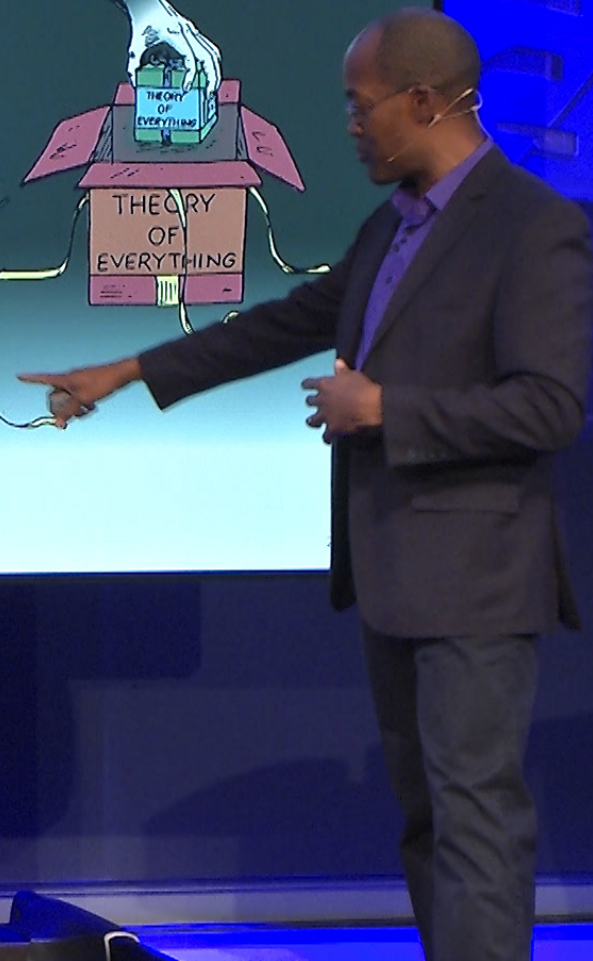
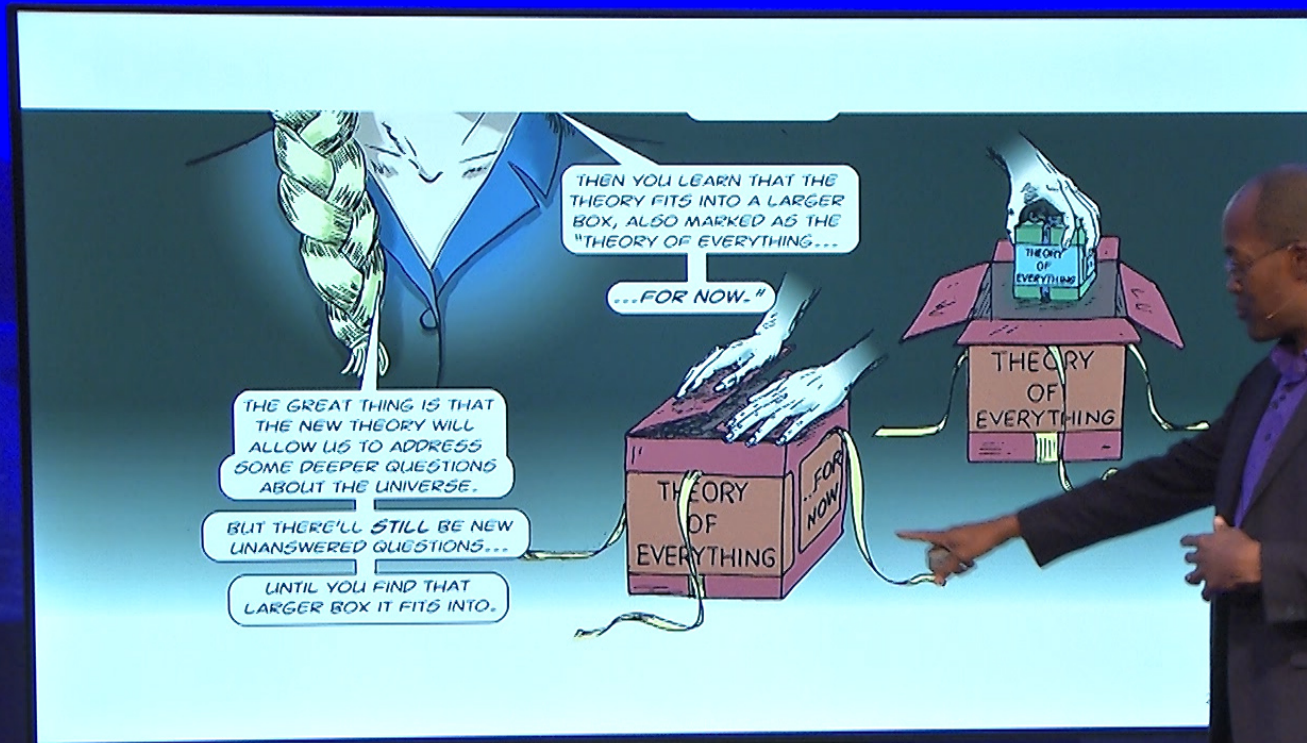


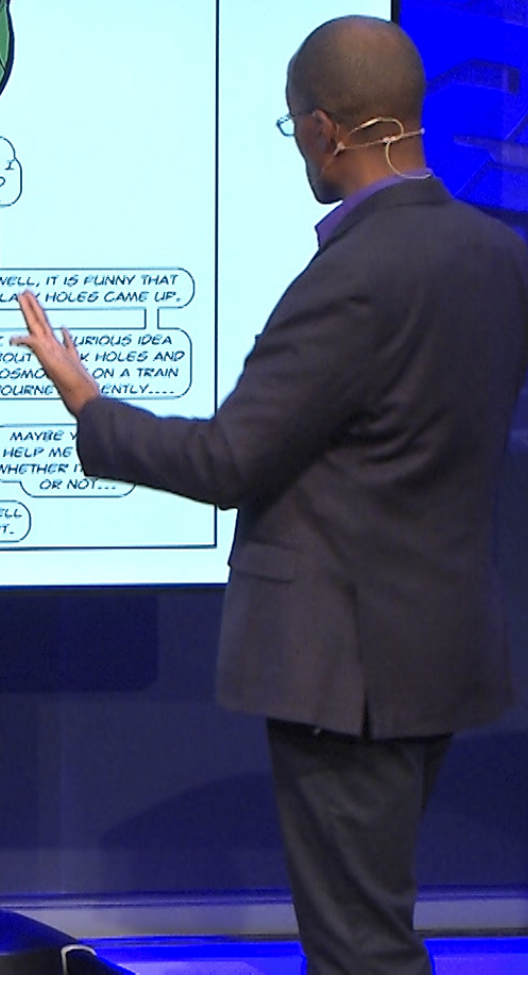


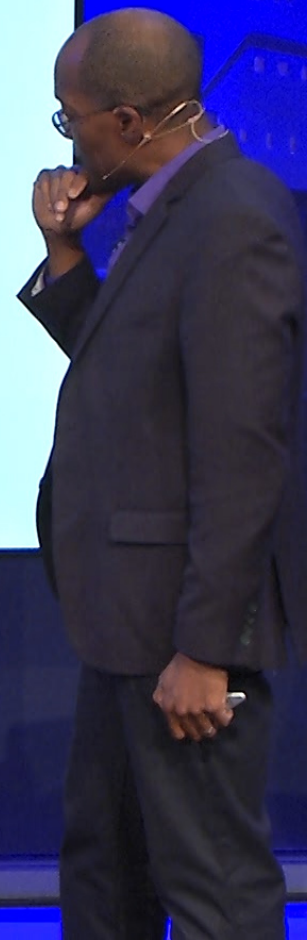
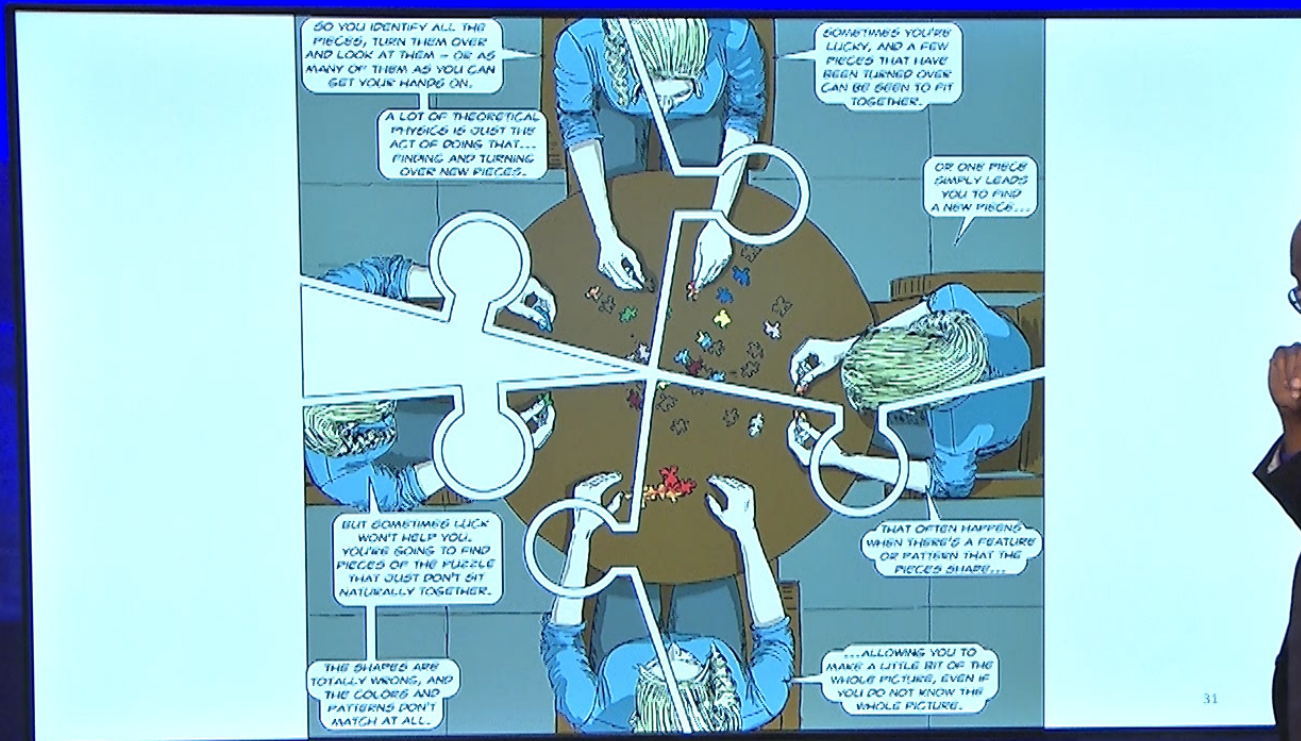


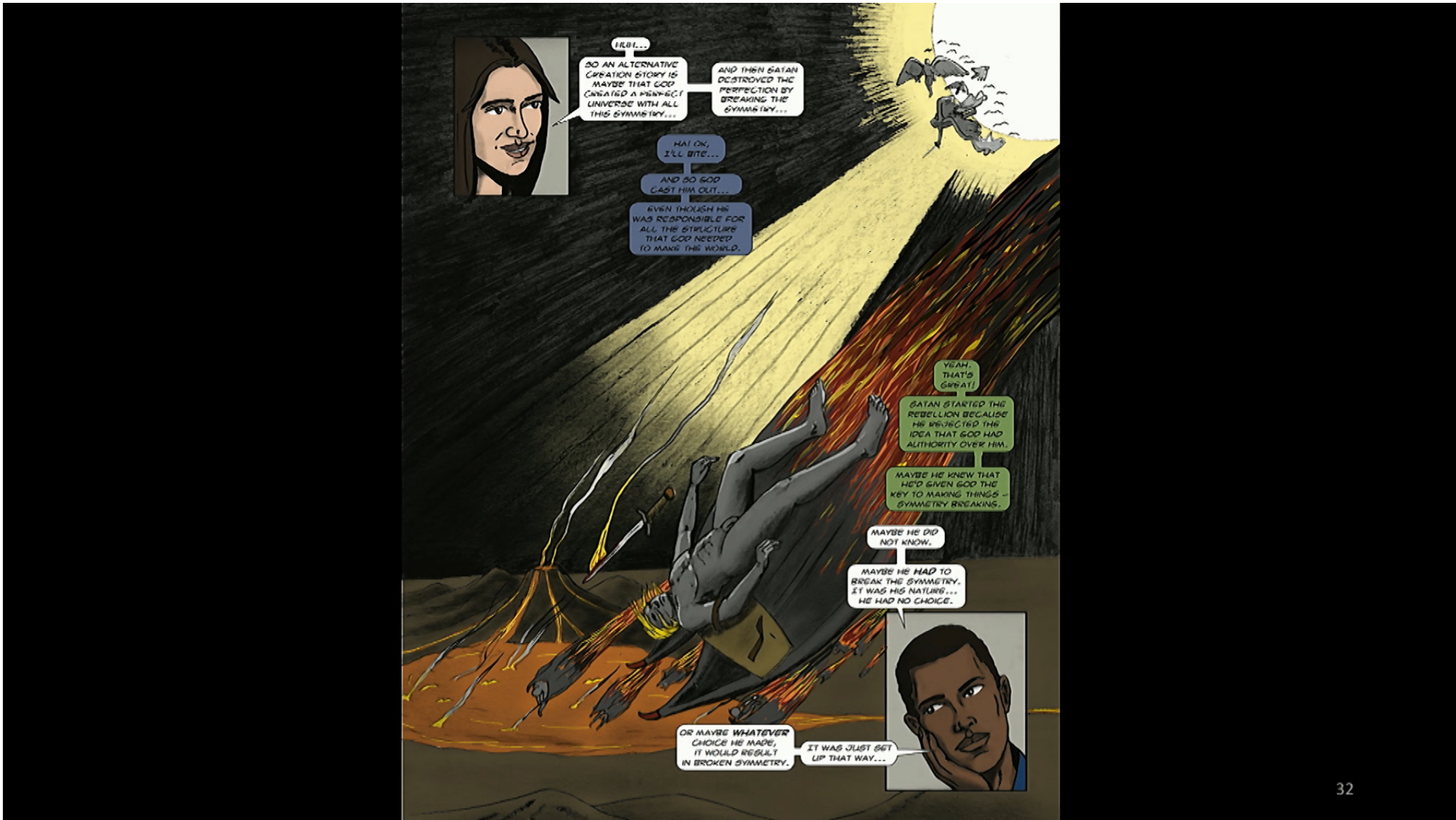




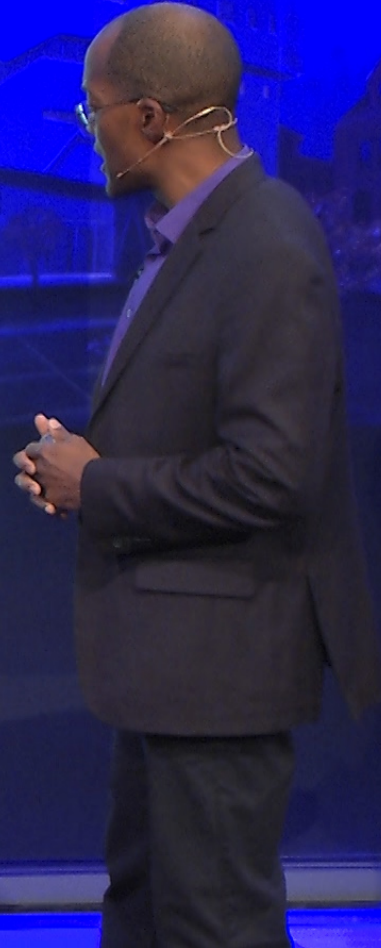


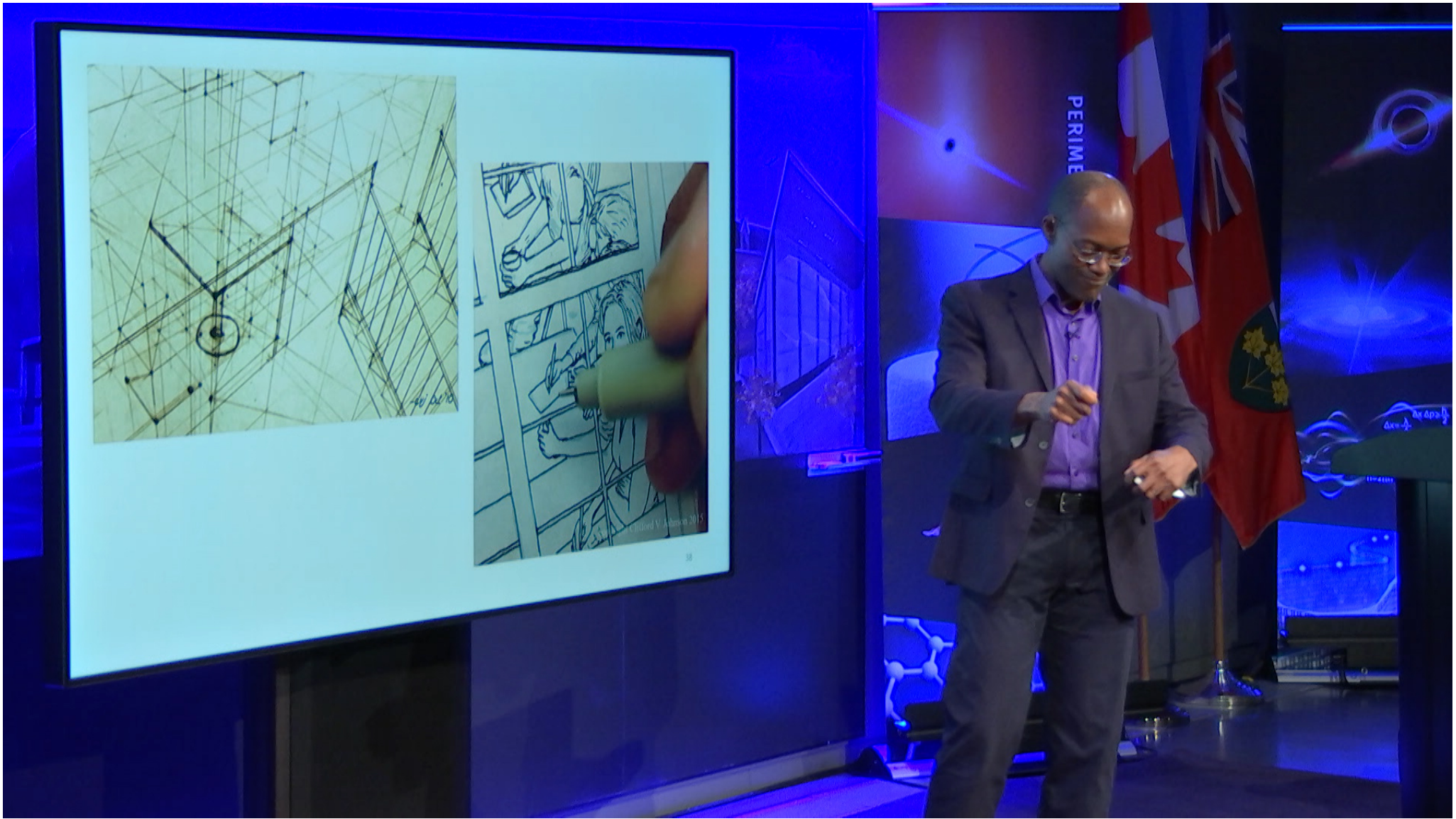


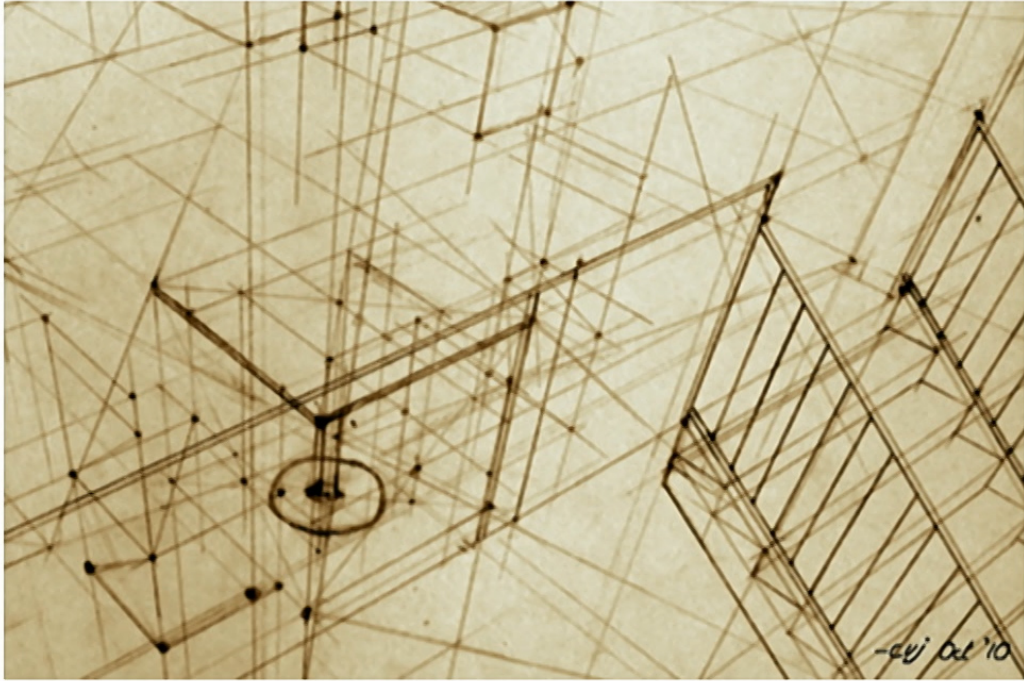






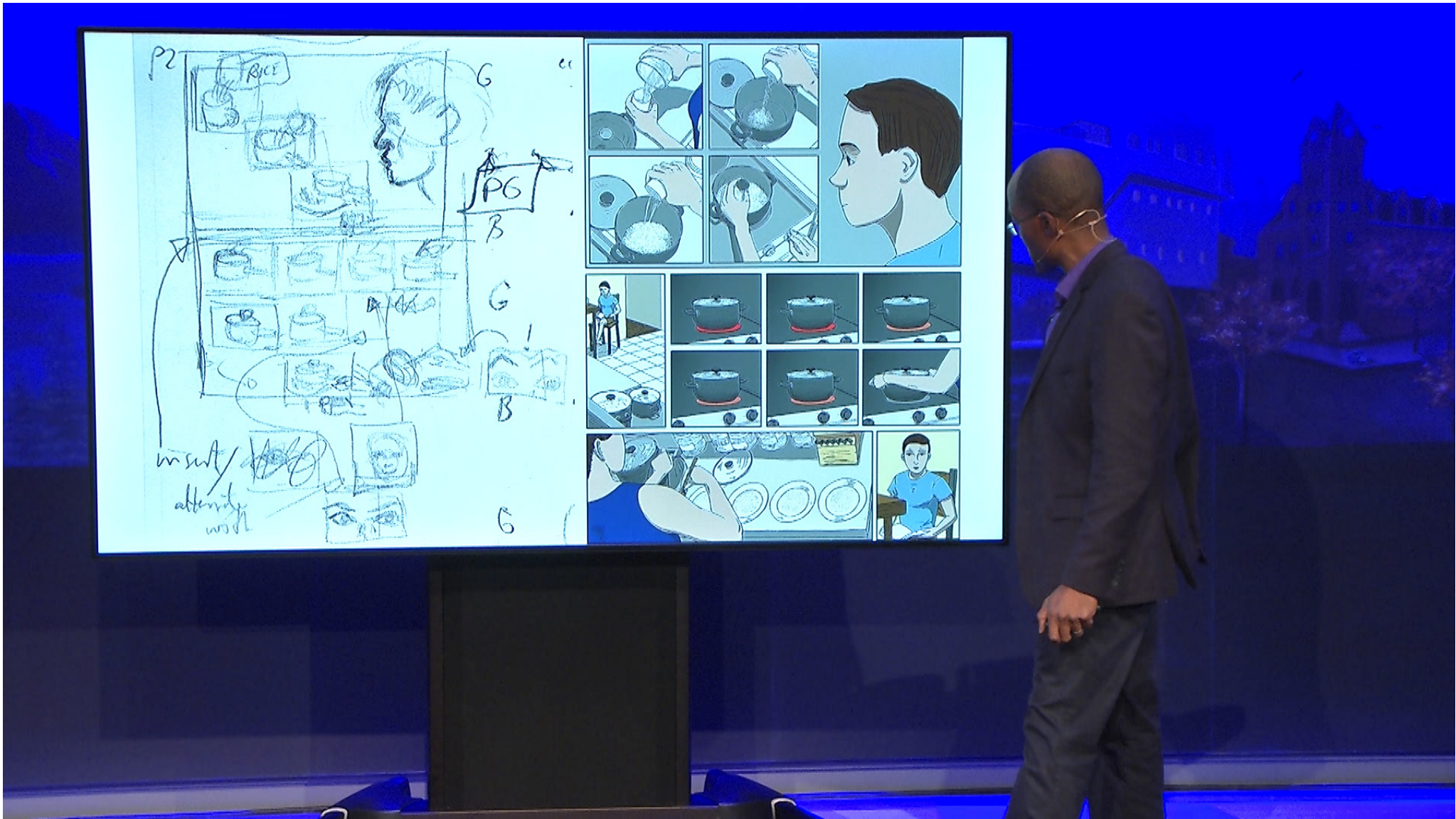




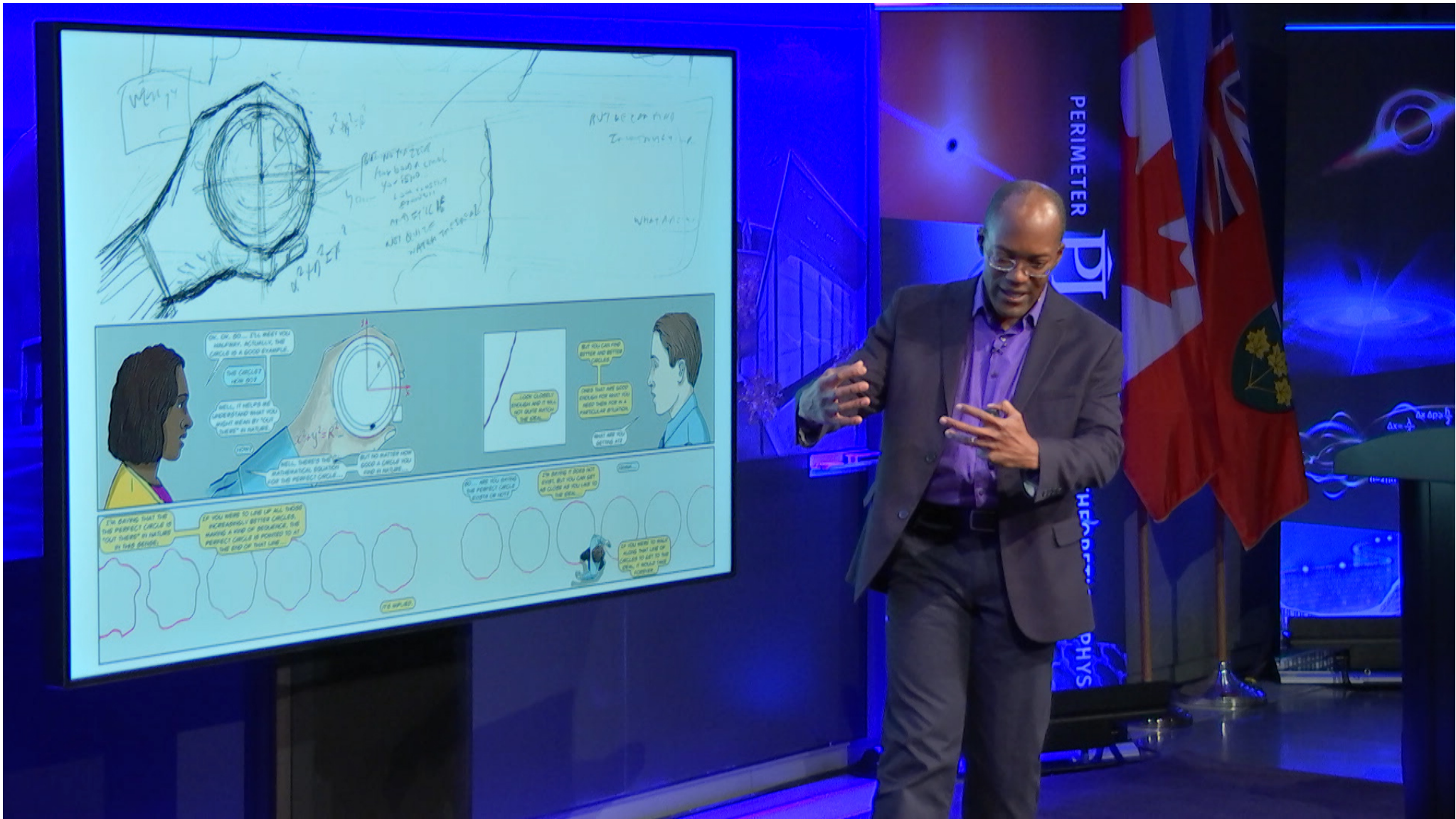




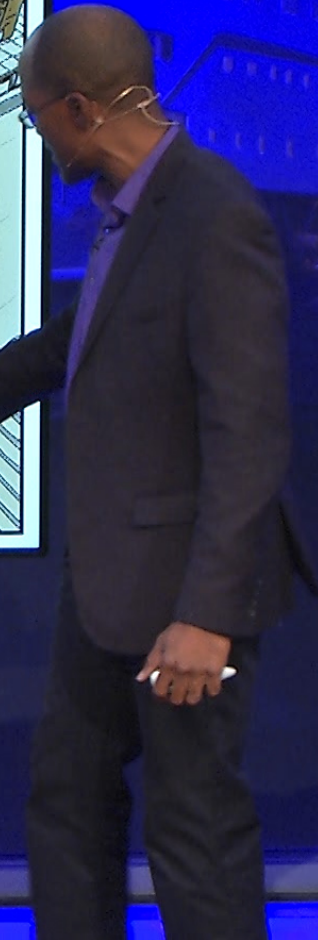
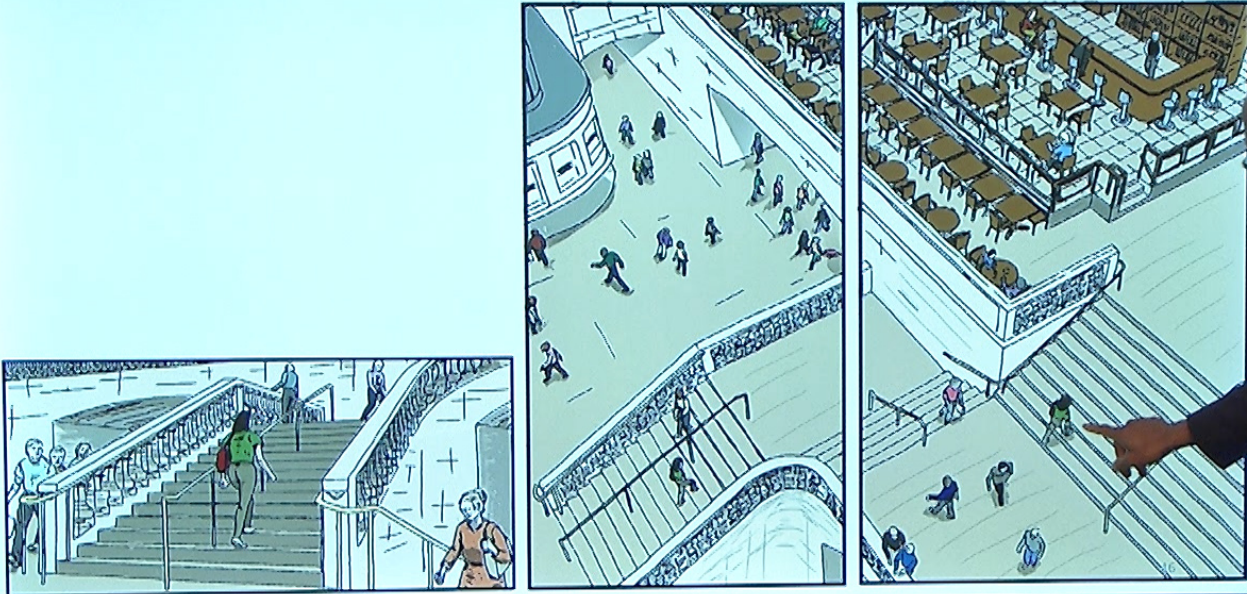




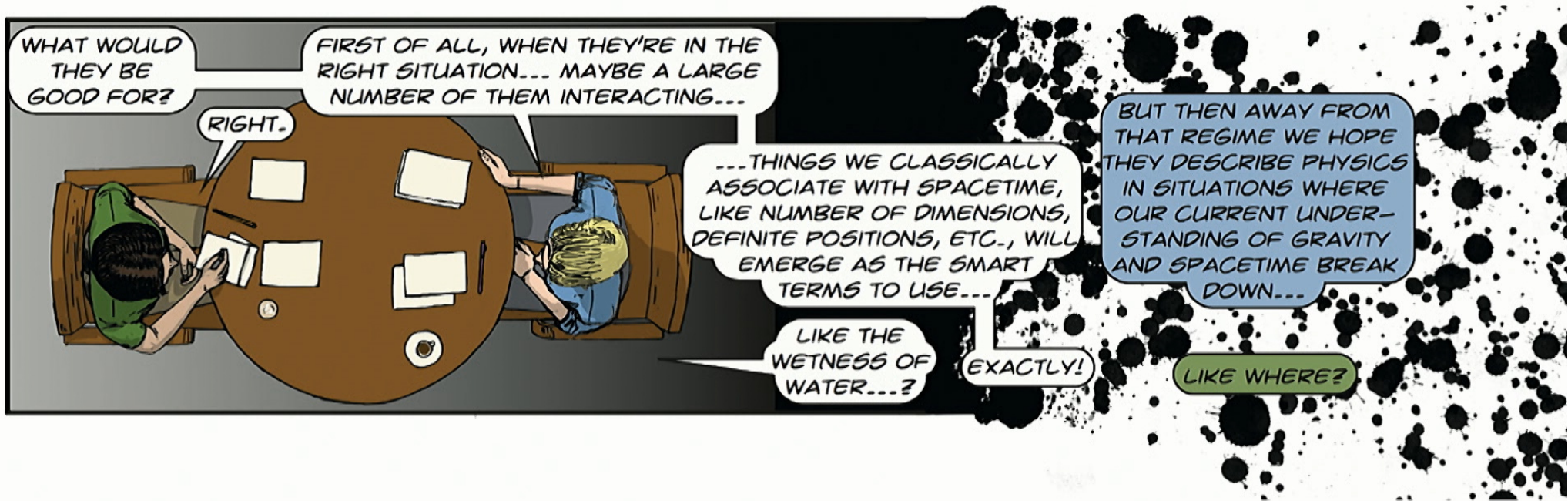




Comics = Physics







WHAT WOULD THEY BE GOOD FOR?

RIGHT.

FIRST OF ALL, WHEN THEY'RE IN THE RIGHT SITUATION... MAYBE A LARGE NUMBER OF THEM INTERACTING...

...THINGS WE CLASSICALLY ASSOCIATE WITH SPACETIME, LIKE NUMBER OF DIMENSIONS, DEFINITE POSITIONS, ETC., WILL EMERGE AS THE SMART TERMS TO USE...

LIKE THE WETNESS OF WATER...?

EXACTLY!

BUT THEN AWAY FROM THAT REGIME WE HOPE THEY DESCRIBE PHYSICS IN SITUATIONS WHERE OUR CURRENT UNDERSTANDING OF GRAVITY AND SPACETIME BREAK DOWN...

LIKE WHERE?

