

You will learn about the  
concepts and ideas of...

Particle Physics

Computing

Accelerators

Statistics

...from leading experts who  
actively work in these fields!

# Topics: Accelerator

## Particle Accelerators and Beam Dynamics

Foteini Asvesta

## Accelerator Technology Challenges

Susana Izquierdo Bermudez

## Future High Energy Collider Projects

Barbara Dalena

# Topics: Accelerator

## Particle Accelerators and Beam Dynamics



## Technology Challenges

## Collider Projects

# Topics: Accelerator

## Particle Accelerators and Beam Dynamics

- Temperature is kept constant
- Magnet does not fall down after releasing the rope



$$\frac{4\pi a^2}{2i+1}$$
$$\frac{2^{2i} \Gamma(i+1/2) \Gamma(i+1)}{\Gamma(i+1)}$$

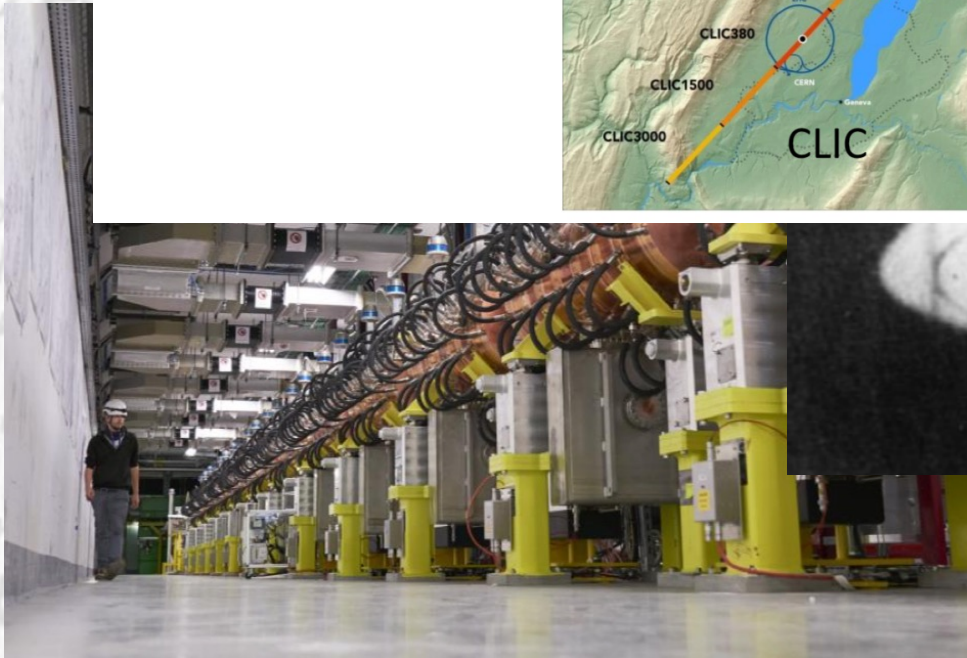
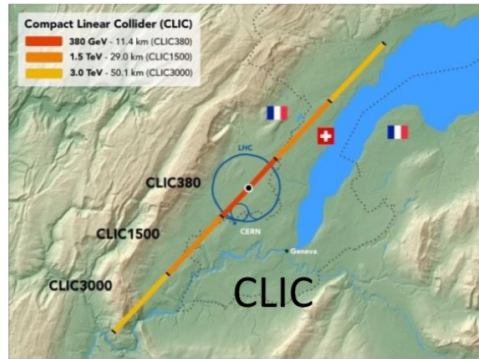
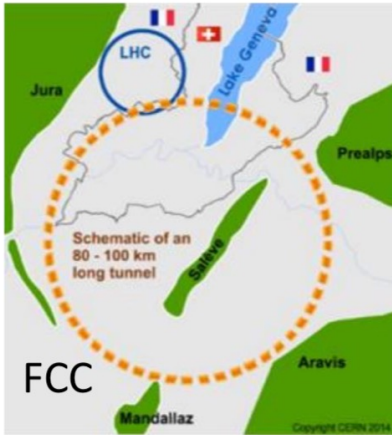
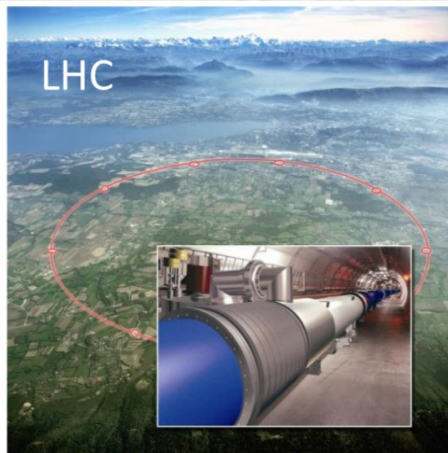
without exception  
you  $\frac{d}{dt}$

# Accelerator

## and Beam Dynamics

Temperature is kept constant  
 does not fall down after  
 the rope

$T < 7.2 K$



$\frac{4\pi a^2}{z^{i+1}}$   
 $z^{2i} \frac{L^i - S^i}{L^i + S^i}$  without exception  
 $\frac{L^i + S^i}{z^{i+1}}$  you  $\frac{d^i}{dt^i}$

# Topics: Detectors

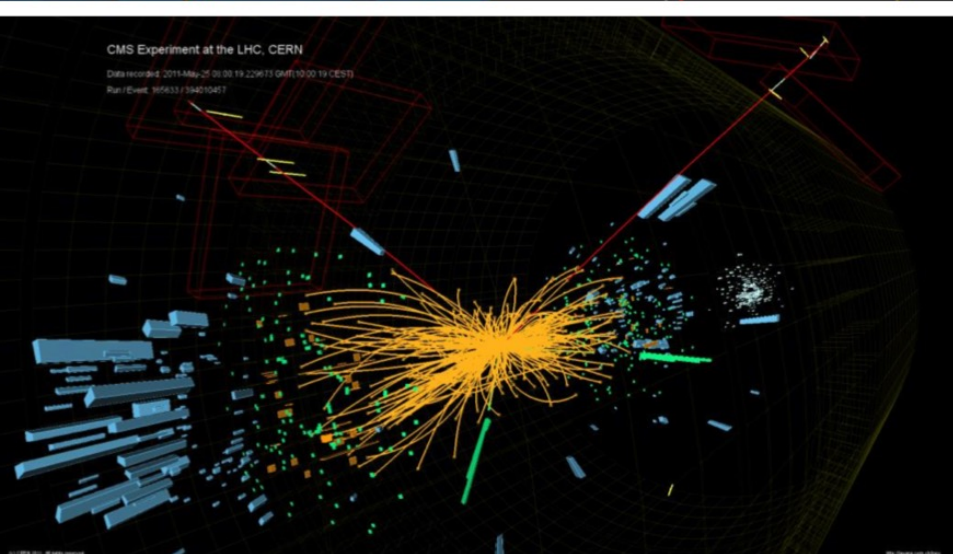
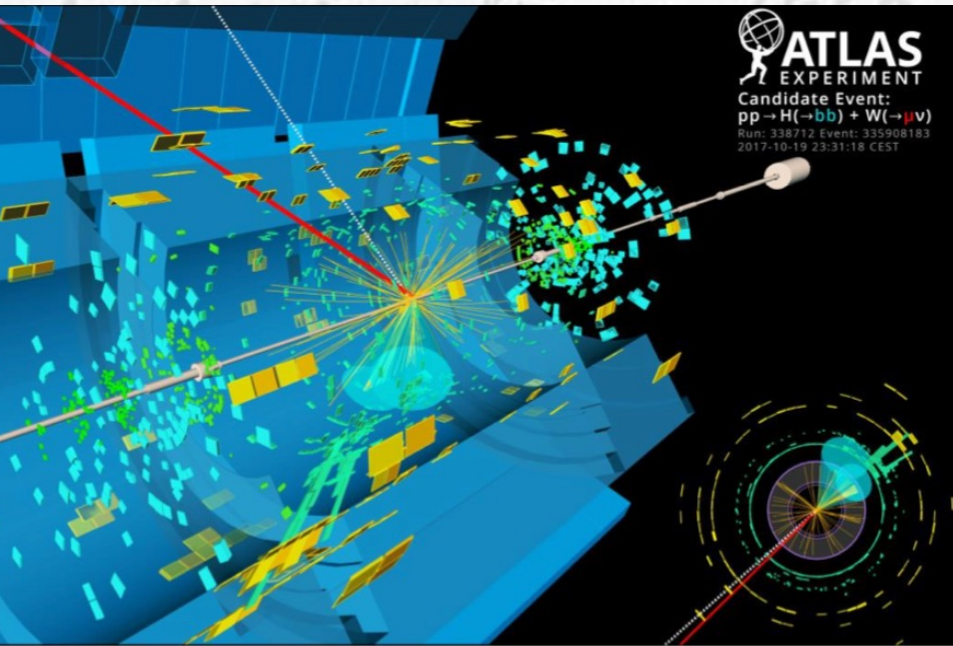
## Detectors

Werner Riegler

## Electronics, DAQ and Triggers

Tommaso Colombo

# Topics: Detectors



ectors

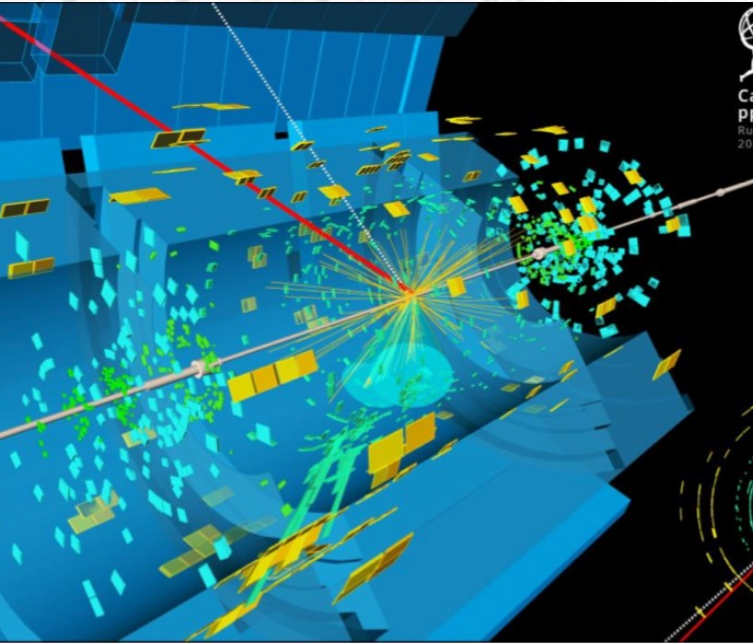
Q and Triggers

$$= \frac{8\pi\alpha^2}{2i+1} \frac{L_i+S}{2^{2S}} \frac{L_i-S}{L_i} \frac{L_i-S}{L_i}$$

$$\frac{4\pi\alpha^2}{2i+1} \frac{2^{2S} L_i-S}{L_i+S} \frac{L_S}{L_S} \frac{L_S}{L_S}$$

without exception  
you  $\frac{d^4}{d^4}$

# Topics: Detectors



$$\frac{2L+1}{2L+1} \frac{2L+1}{2L+1} \frac{L+1}{L+1} \frac{L+1}{L+1}$$
  
without exception  
you  $\frac{d^2}{dt^2}$



# Topics: Experiment

## From Raw Data to Physics Results

Paul Laycock

## Experimental Physics at Hadron Colliders

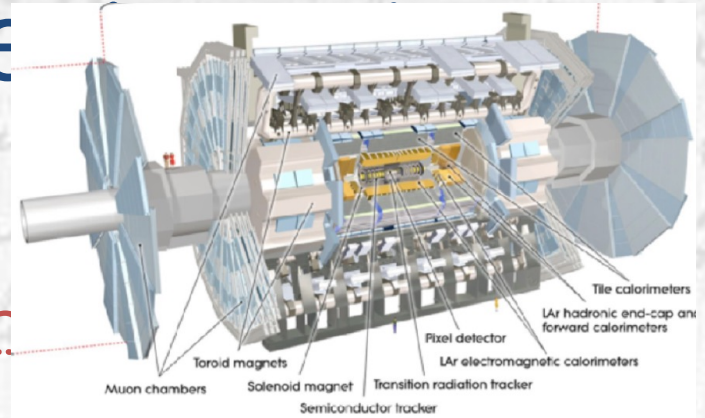
Markus Klute

## Experimental Physics at Lepton Colliders

Frank Simon

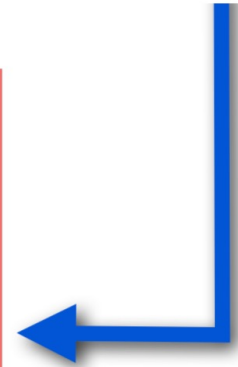
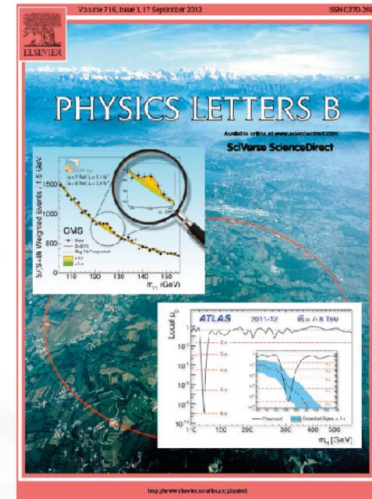
# Topics: Expe

From Raw Data to Ph



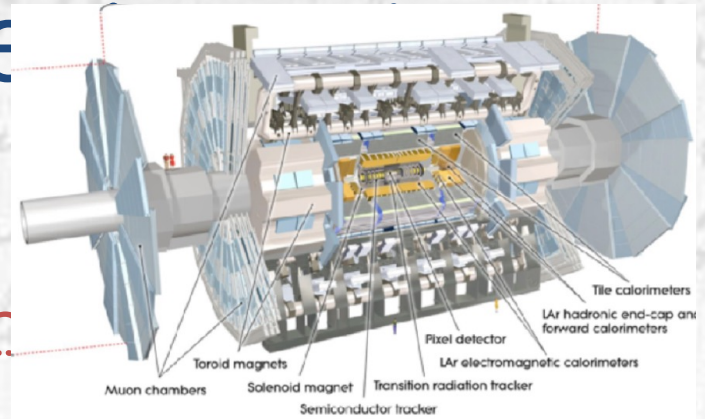
Experimental Physics at

Experimental Physics at



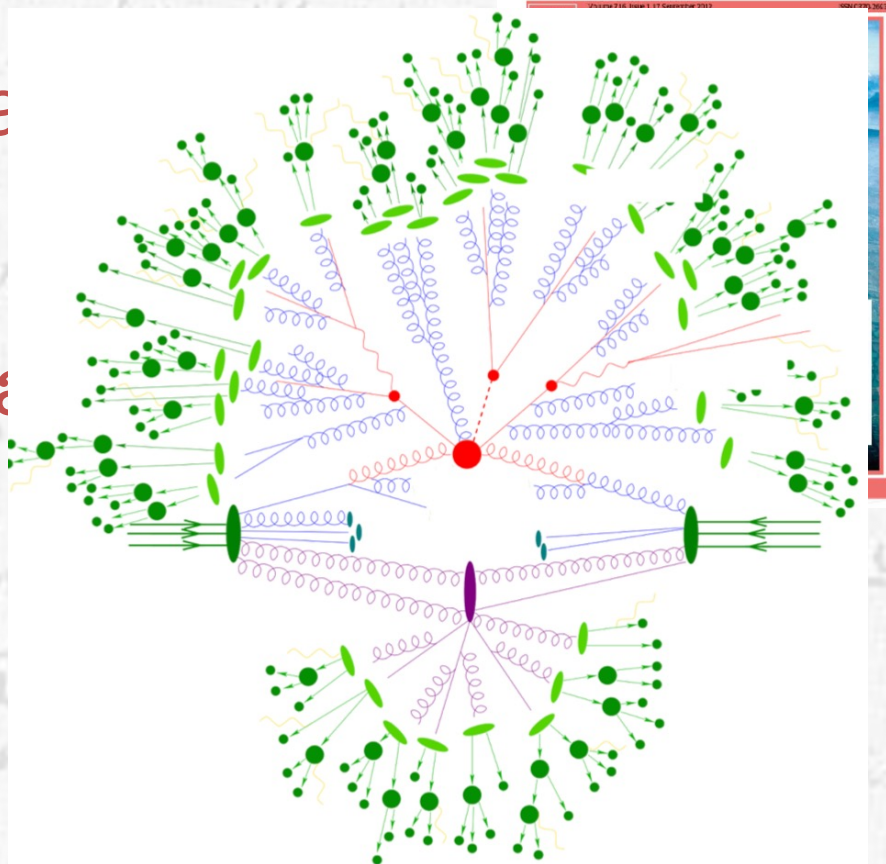
# Topics: Expe

## From Raw Data to Ph

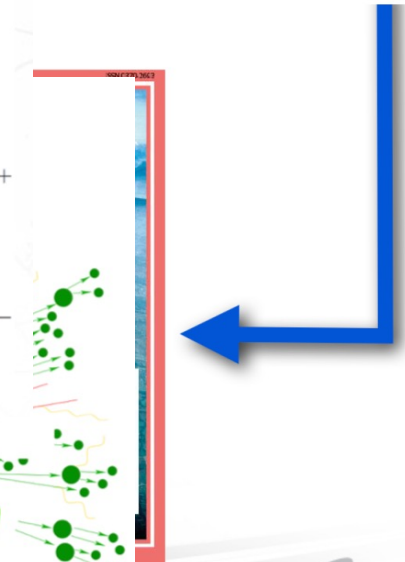
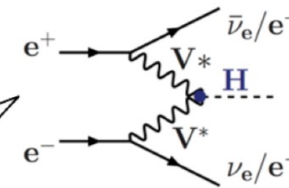
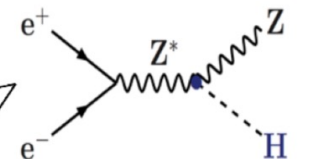
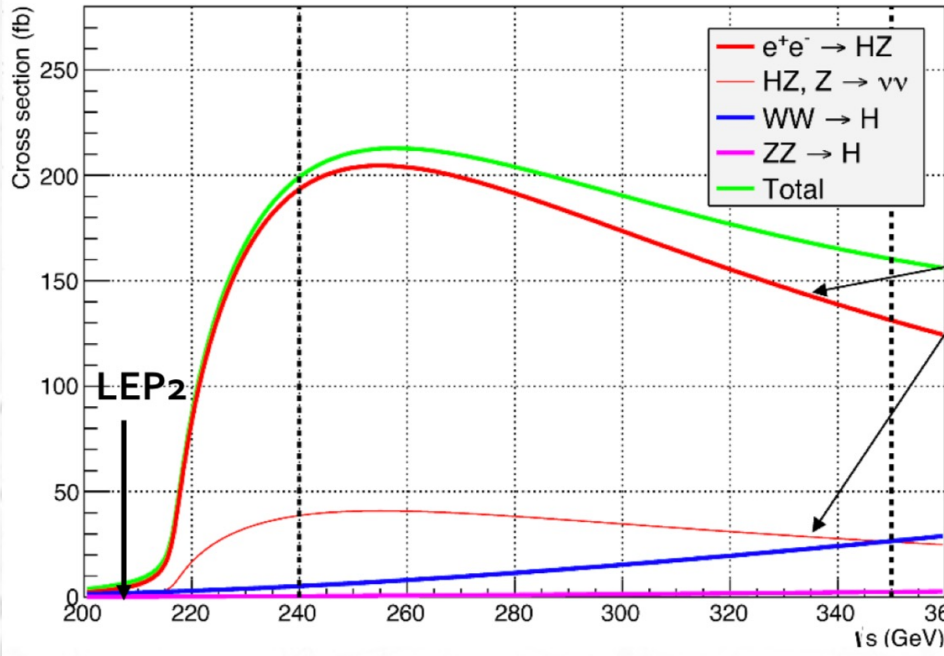
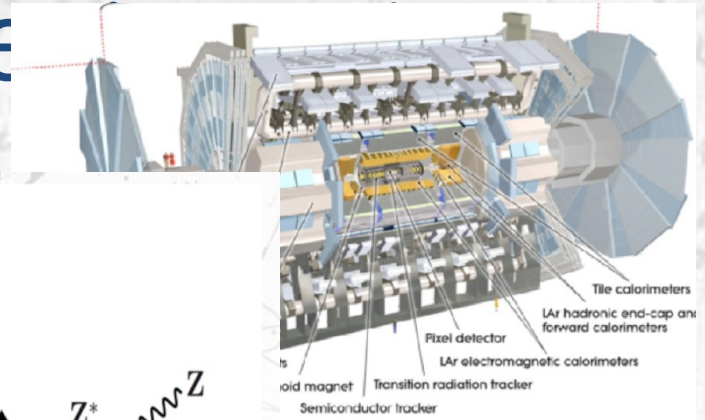


Experimenta

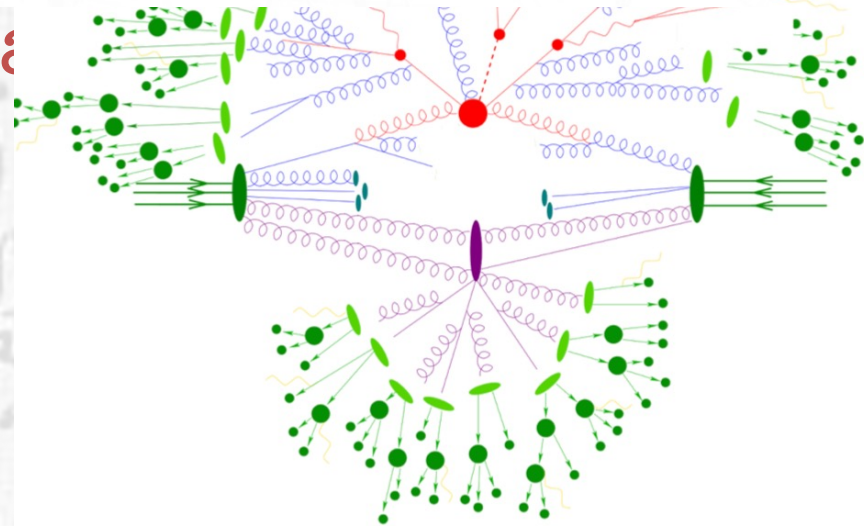
Experimenta



# Topics: Expe



## Experiments



# Topics: Experiment

Heavy Ions

Francesca Bellini

Nuclear Physics at CERN

Magdalena Kowalska

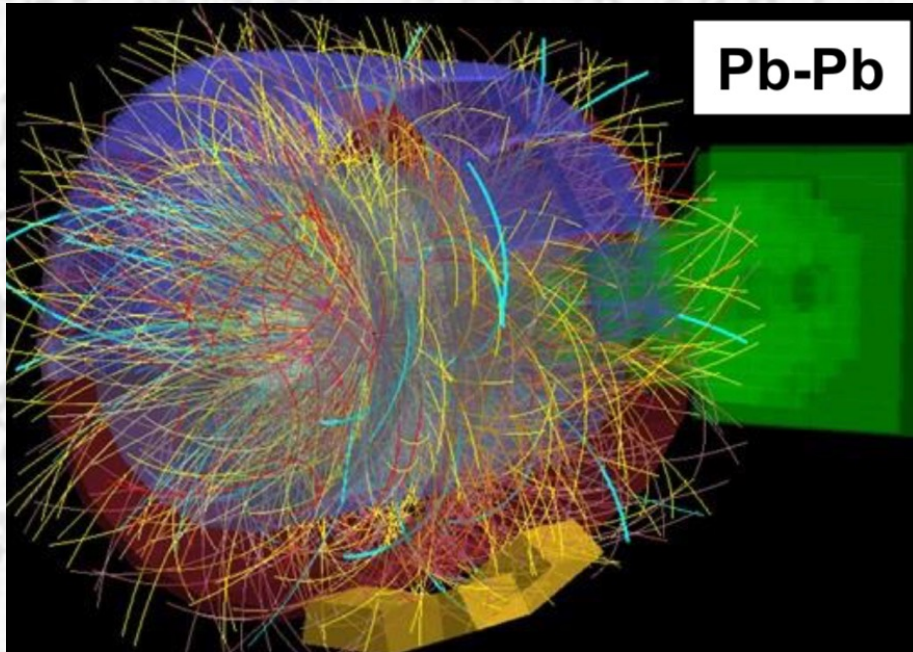
Flavour Physics

Mark Williams

Antimatter in the Lab

Jack Devlin

# Topics: Experiment



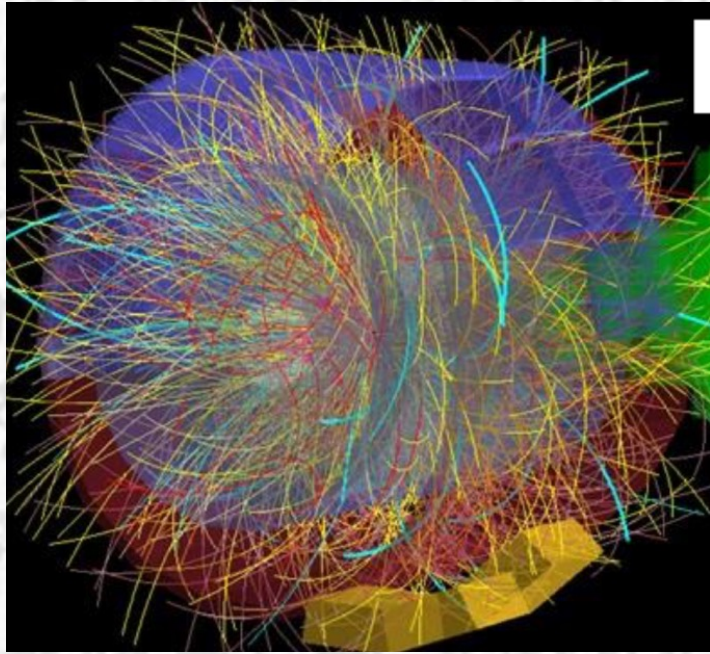
Ions

Physics at CERN

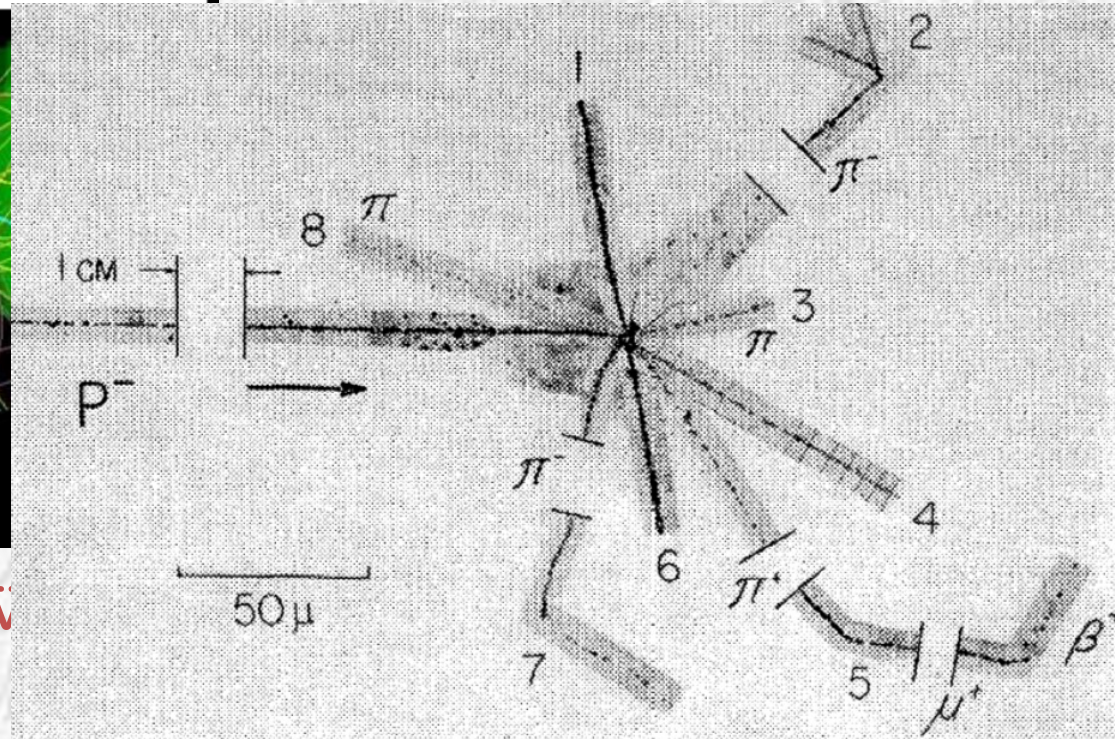
Flavour Physics

Antimatter in the Lab

# Topics: Experiment



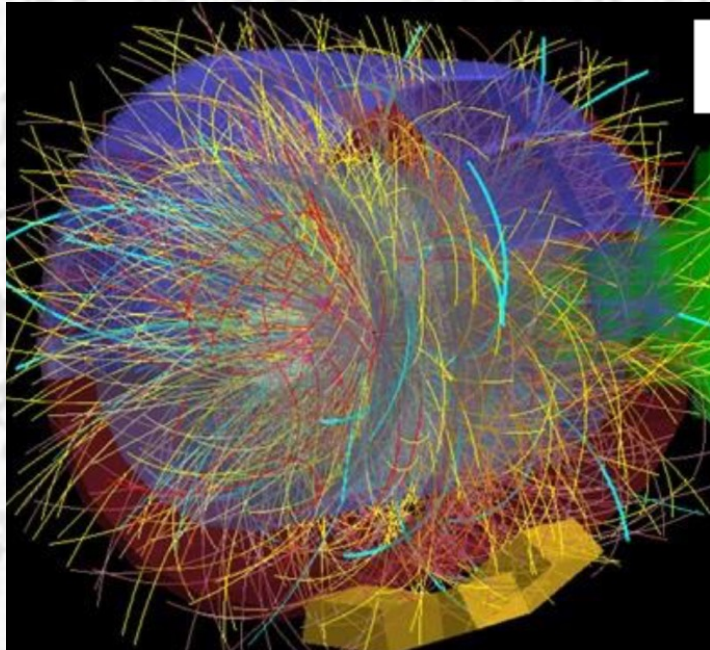
Pb-Pb



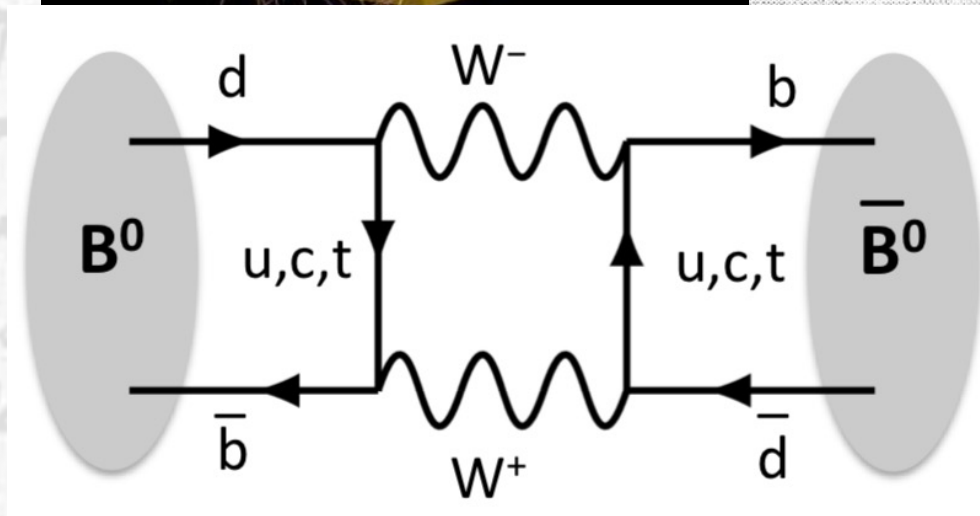
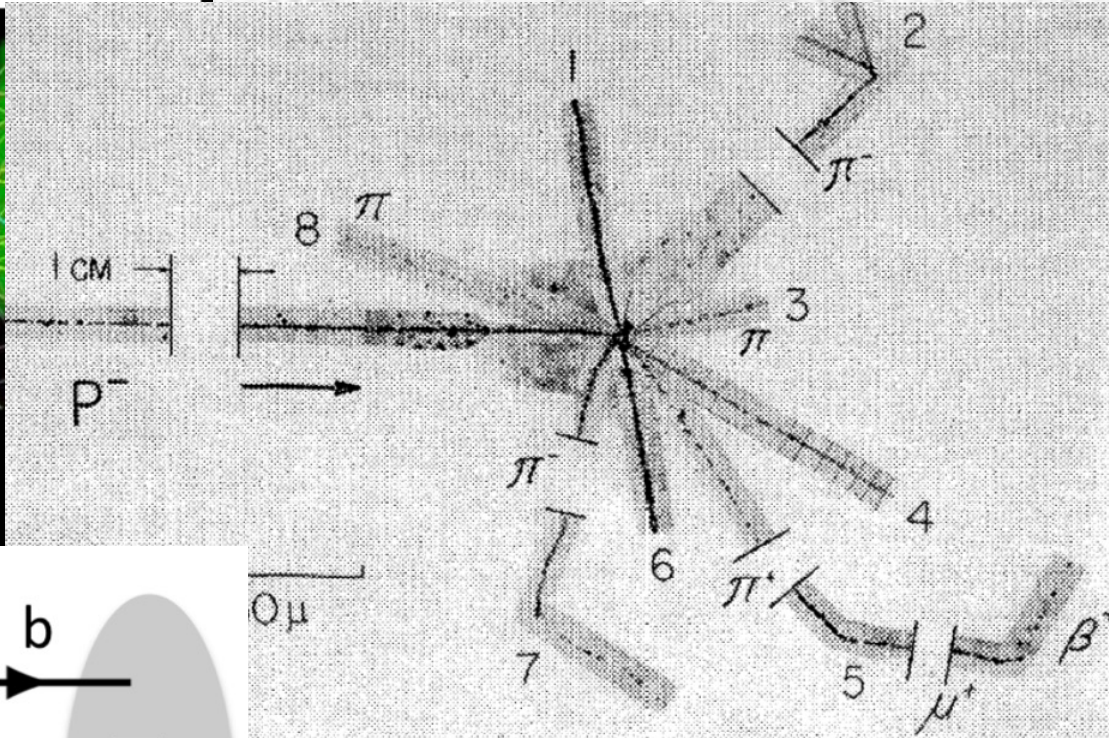
Flav

Antimatter in the Lab

# Topics: Experiment



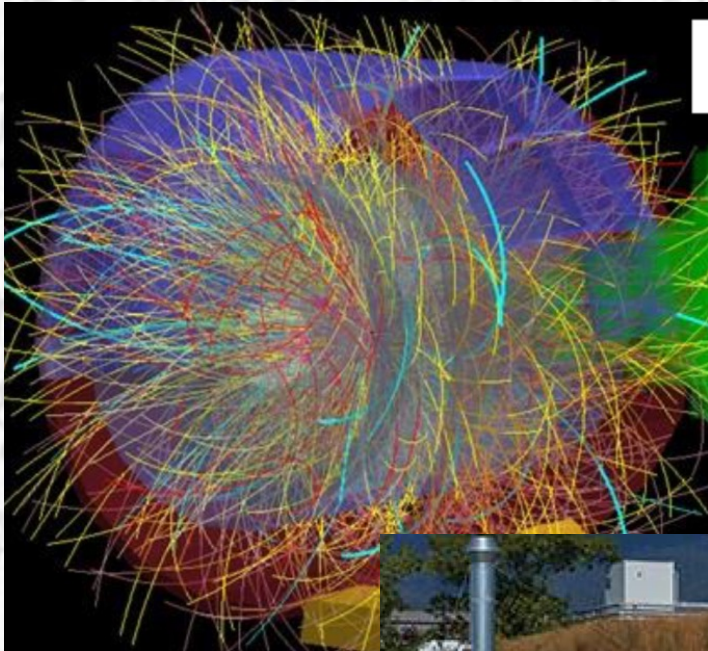
Pb-Pb



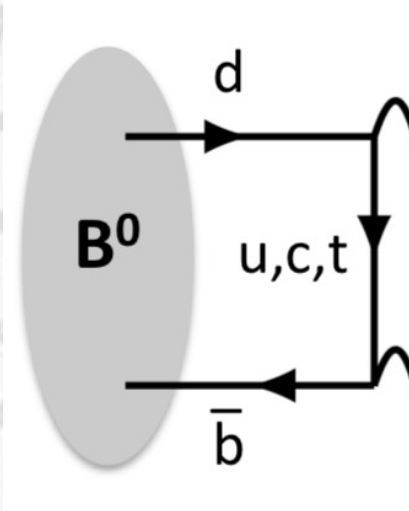
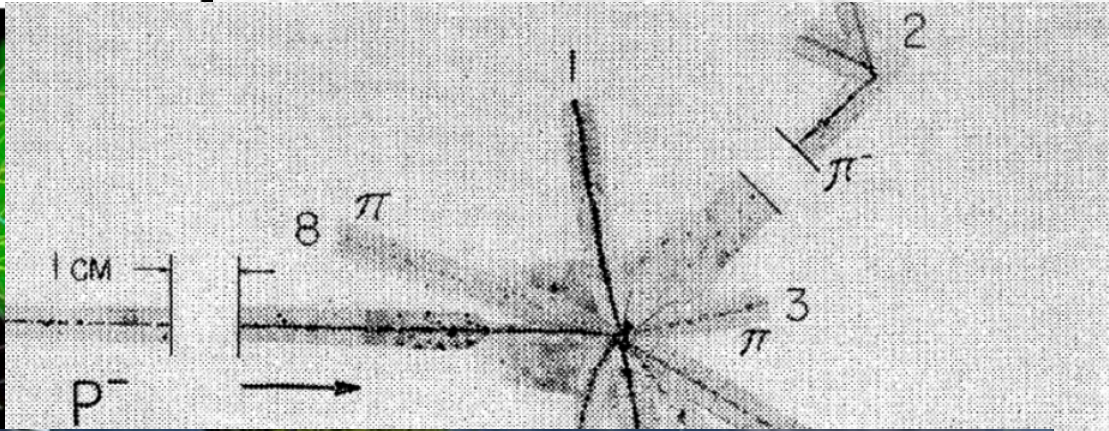
n the Lab



# Topics: Experiment



Pb-Pb



$W^+$

$\bar{d}$

VIII

$2^{\text{nd}} \text{ } \underline{L+S} \text{ } \underline{L+S} \text{ } \underline{L+S}$  without exception  
 $\underline{L+S}$  you  $\frac{d^2}{dt^2}$

# Topics: Theory

## Particle World

David Tong

## Theoretical Concepts in Particle Physics

Tim Cohen

## Beyond the Standard Model

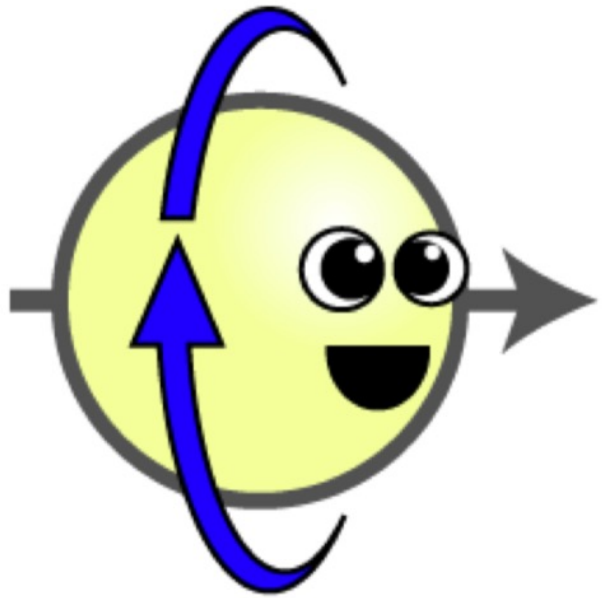
Tevong You

## Making Predictions at Hadron Colliders

Alexander Huss

## What is String Theory?

Timo Weigand



Topics: Theory

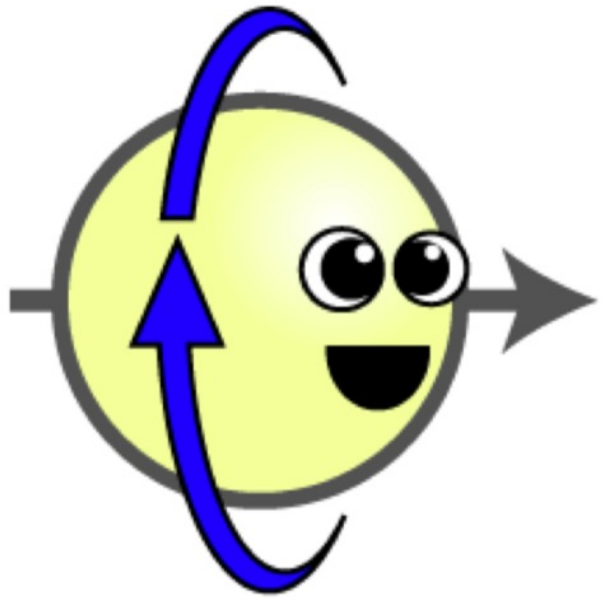
Particle World

Concepts in Particle Physics

Beyond the Standard Model

Making Predictions at Hadron Colliders

What is String Theory?



Topics: Theory

Particle World

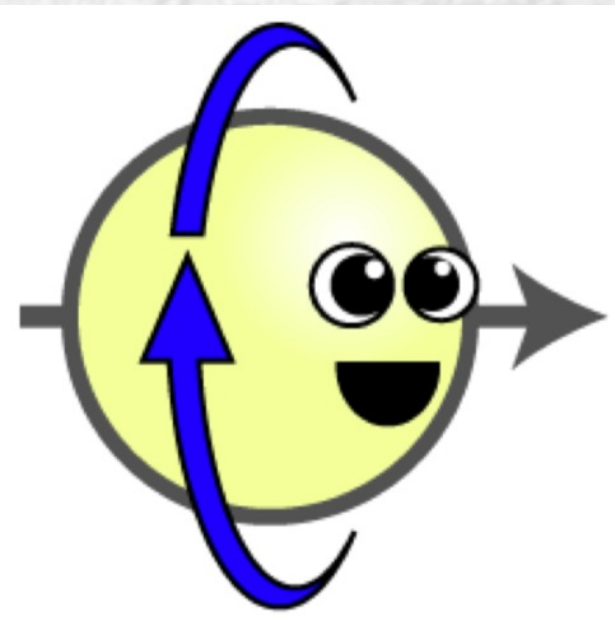
Concepts in Particle Physics

3 ≠ 2

Beyond the Standard Model

Making Predictions at Hadron Colliders

What is String Theory?



Topics: Theory

Particle World

Concepts in Particle Physics

3 ≠ 2

Beyond the Standard Model

Making Predictions at Hadron Colliders

$$\mathcal{M} = \text{tree} + \text{loop} + \dots$$

$\mathcal{O}(\alpha)$                        $\mathcal{O}(\alpha\alpha_s)$

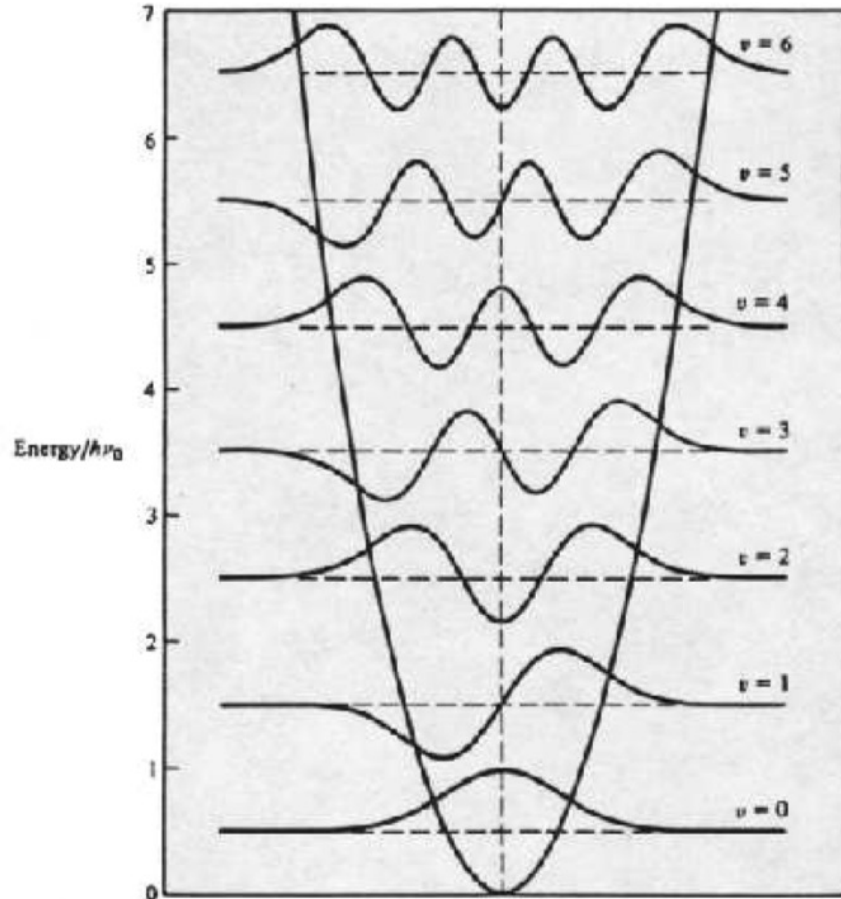
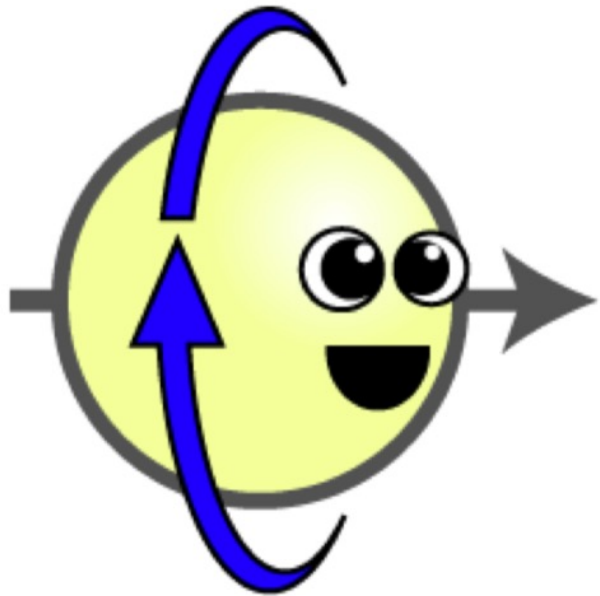
# Topics: Theory

Particle World

Concepts

Beyond the

Making Prediction

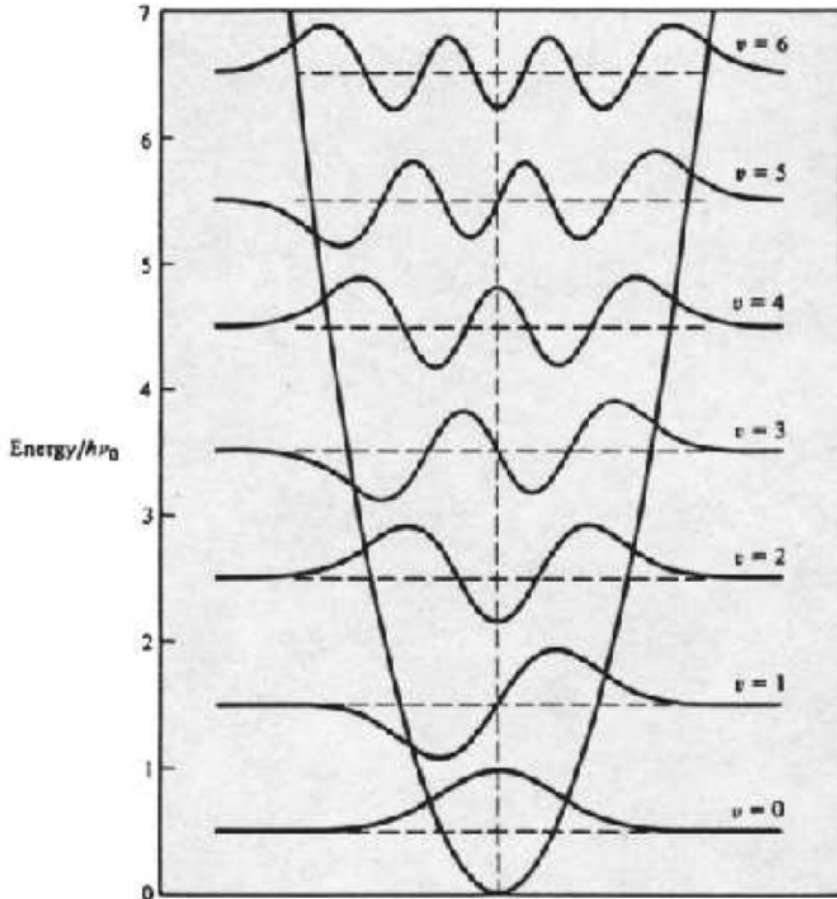
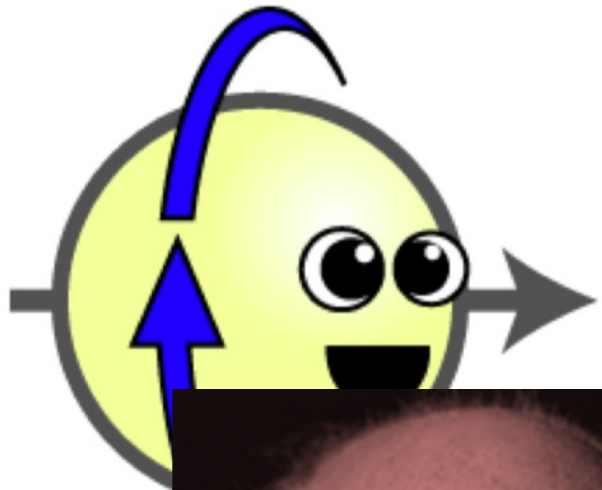


$$\mathcal{M} = \text{[tree diagram]} + \text{[loop diagram]} + \dots$$

$\mathcal{O}(\alpha)$                        $\mathcal{O}(\alpha\alpha_s)$

# Topics: Theory

## Particle World



$\mathcal{M}$

$\mathcal{O}(\alpha)$

+

$\mathcal{O}(\alpha\alpha_s)$

+ ...

# Topics: Astroparticle

Astroparticle Physics

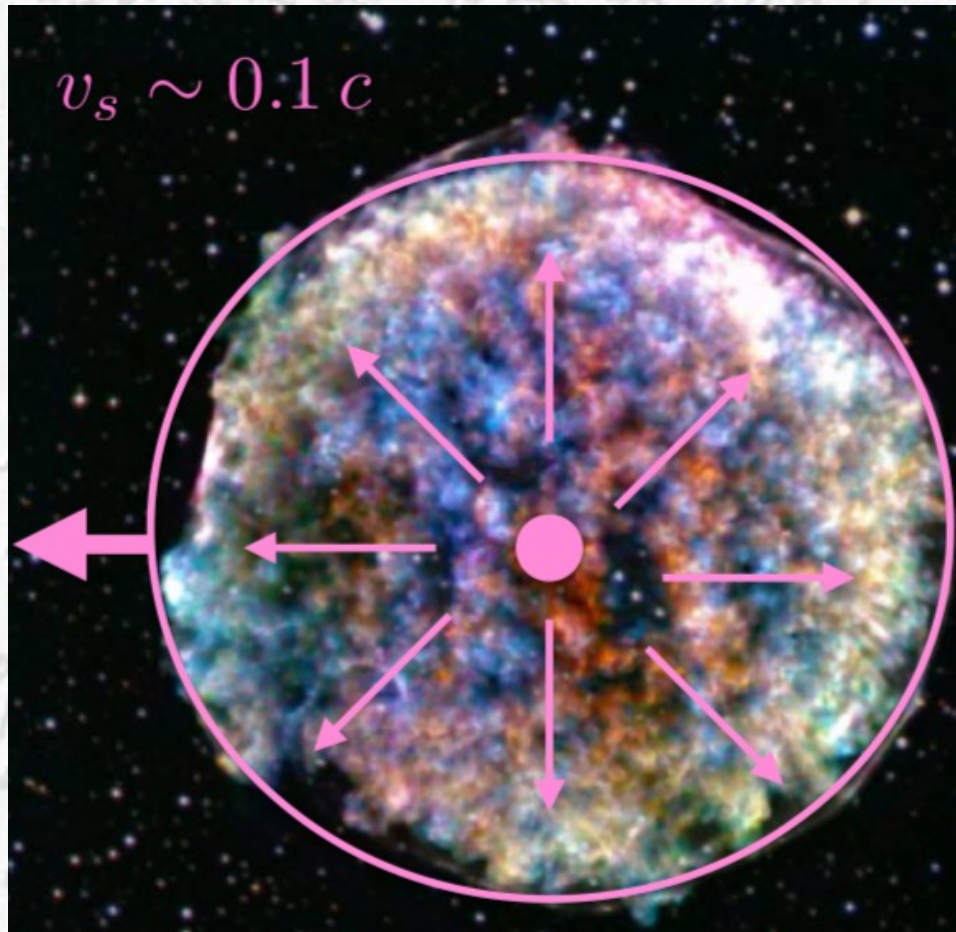
Bradley Kavanagh

Introduction to Cosmology

Valerie Domcke



# Topics: Astroparticle



le Physics

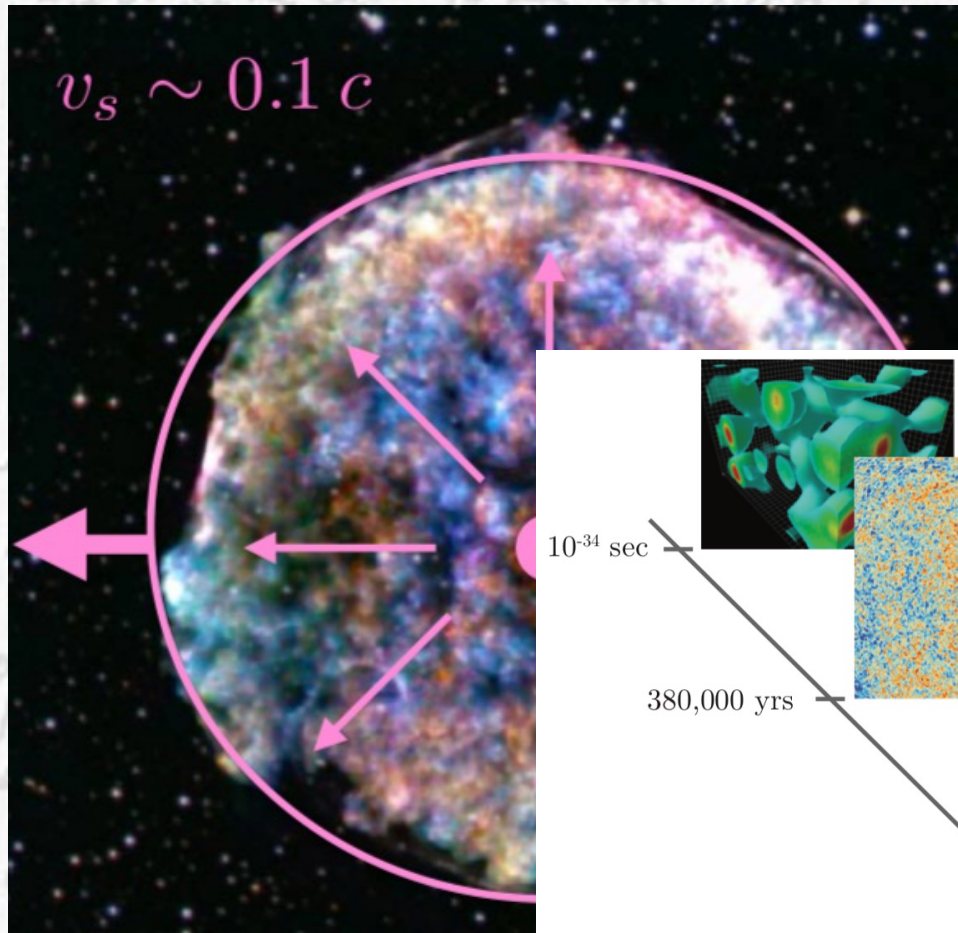
o Cosmology

except when  $S=0$  when  $\int (Q_i)^2 dS = \frac{4\pi a^2}{2i+1}$

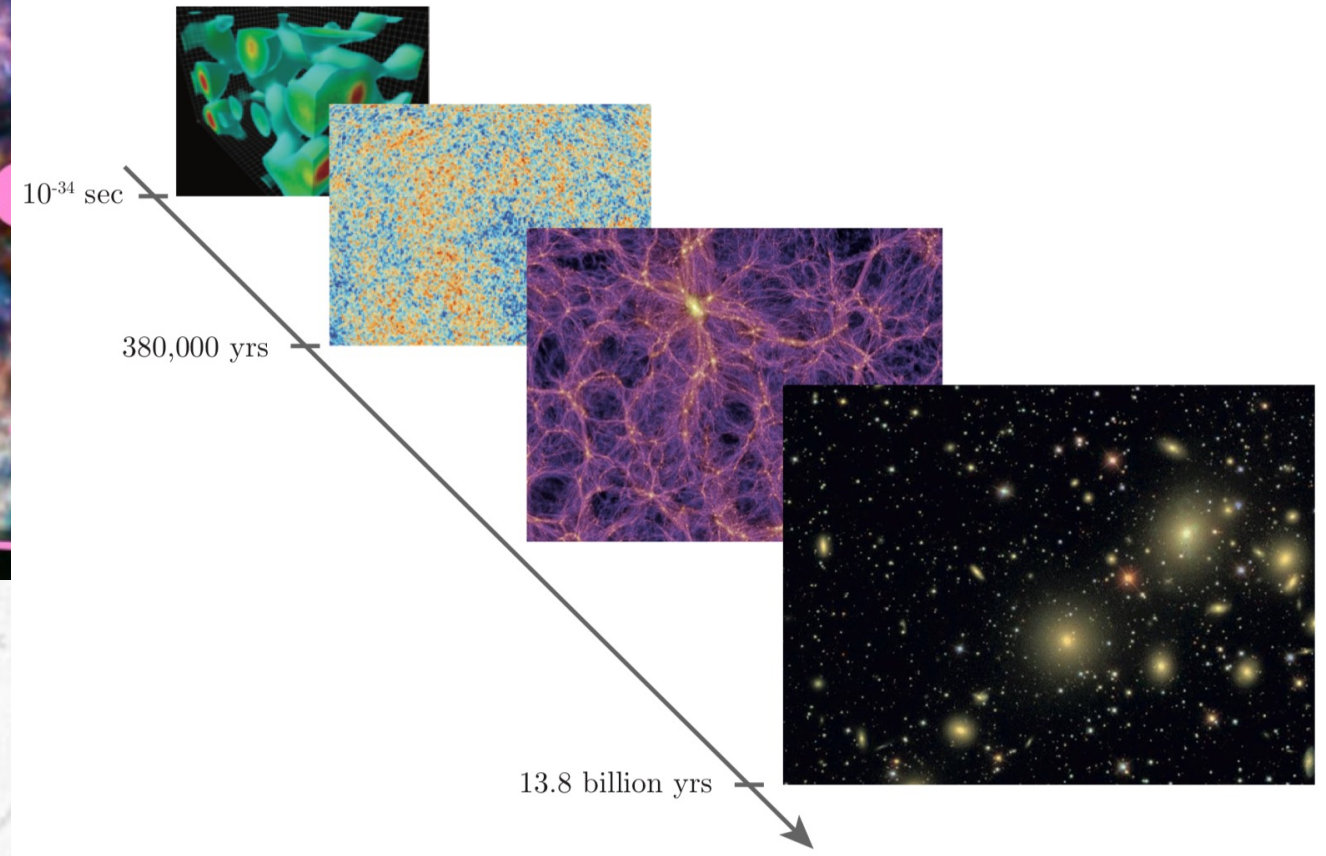
Hence  $\int_{-1}^{+1} (Q_i^{(S)})^2 d\mu = \frac{2}{2i+1} \frac{2^{2i} \Gamma(i-S) \Gamma(S)}{\Gamma(i+S)}$  without exception

you  $\frac{d}{dt}$

# Topics: Astroparticle



## Particle Physics

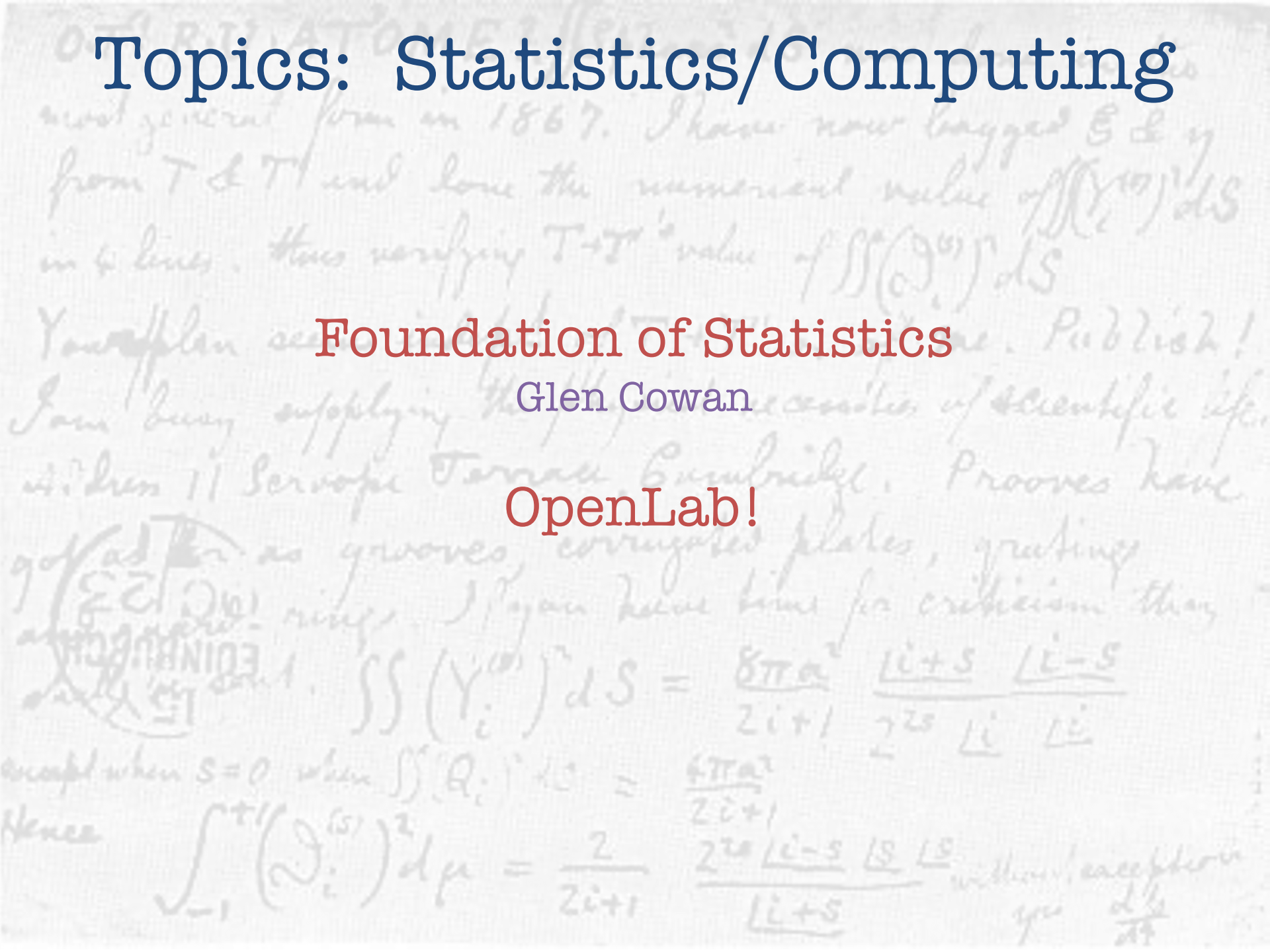


# Topics: Statistics/Computing

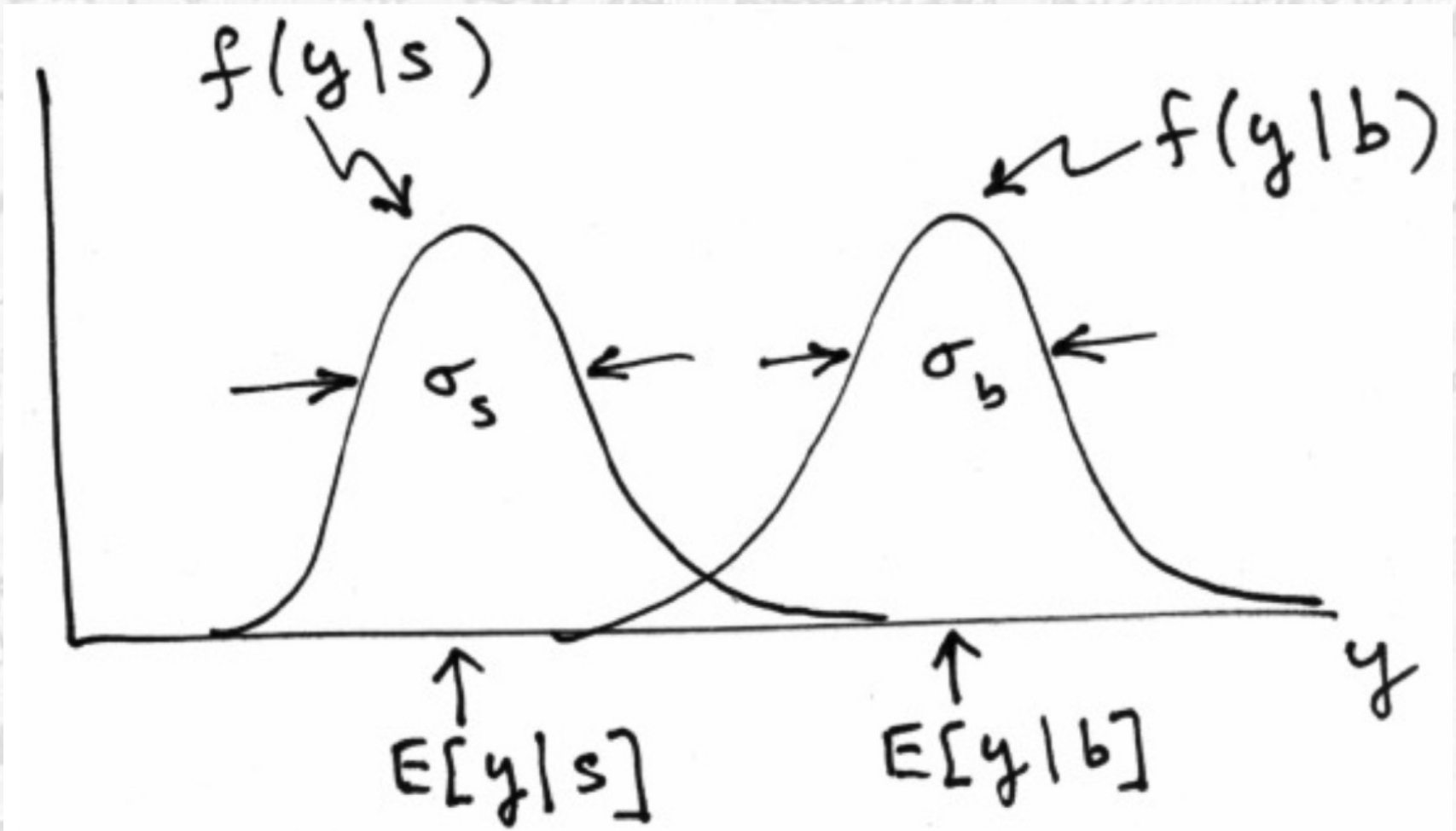
## Foundation of Statistics

Glen Cowan

OpenLab!



# Topics: Statistics/Computing



$$\int_{-\infty}^{\infty} (2i) dx = \frac{L}{2i+1} \frac{2^{2i} \Gamma(i+1/2) \Gamma(i+1/2)}{\Gamma(2i+1)}$$

without exception you  $\frac{d}{dx}$

# Summary

CERN is where these topics and the people who work on them collide!

This is your chance take advantage of the full breadth of topics to learn about!

We hope you have an enriching time at CERN and a fantastic summer!