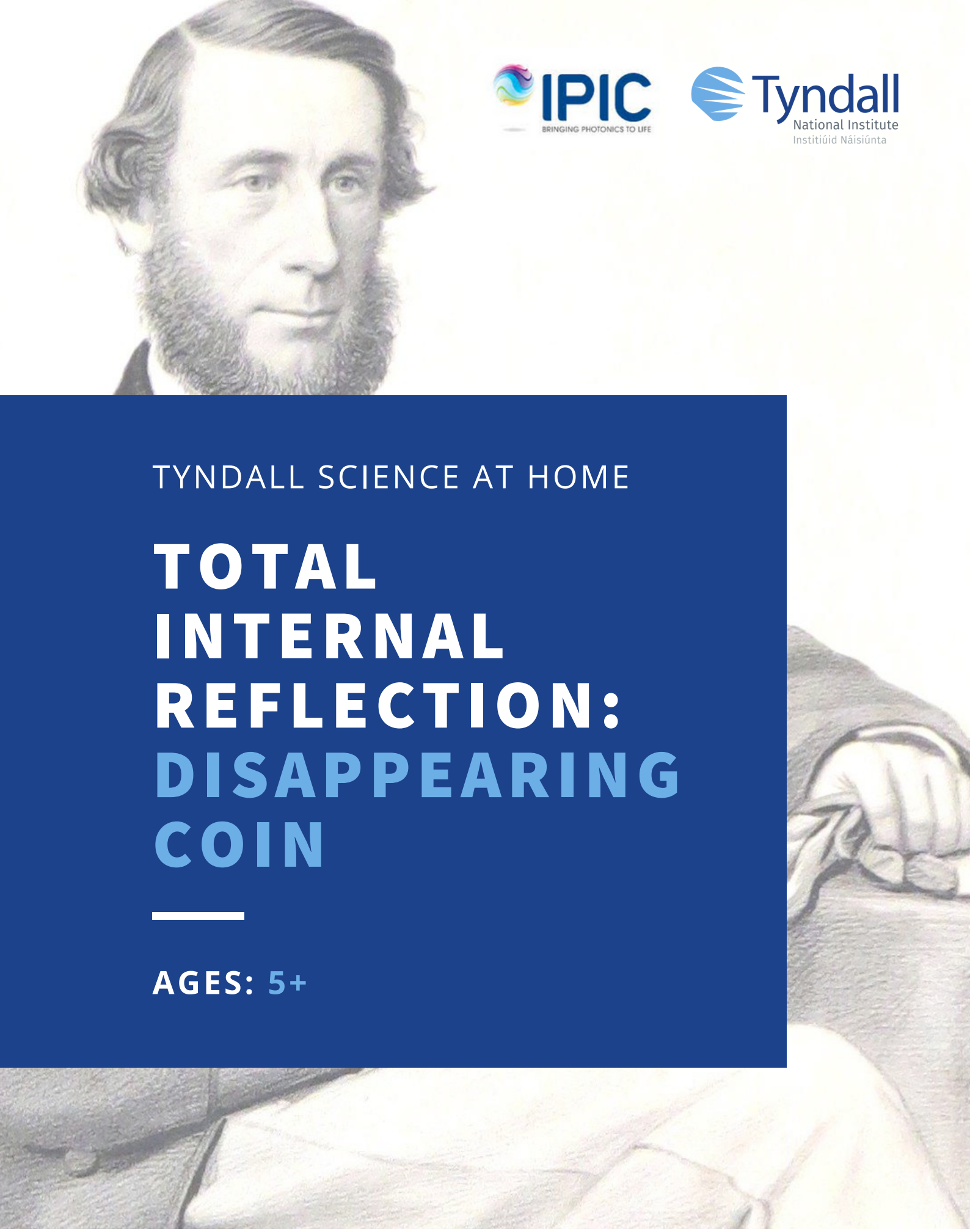

IPIC
BRINGING PHOTONICS TO LIFE

Tyndall
National Institute
Institiúid Náisiúnta

TYNDALL SCIENCE AT HOME

TOTAL INTERNAL REFLECTION: DISAPPEARING COIN

AGES: 5+

ucc
Coláiste na hOllscoile Corcaigh, Éire
University College Cork, Ireland

Rialtas na hÉireann
Government of Ireland

Tionscadal Éireann
Project Ireland
2040

Ireland's European Structural and Investment Funds Programmes 2014-2020
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European Union
European Structural and Investment Funds

SFI
Science Foundation Ireland

#Tyndall200

A national celebration to mark the bicentenary of John Tyndall, one of Ireland's most imaginitive and influential scientists.

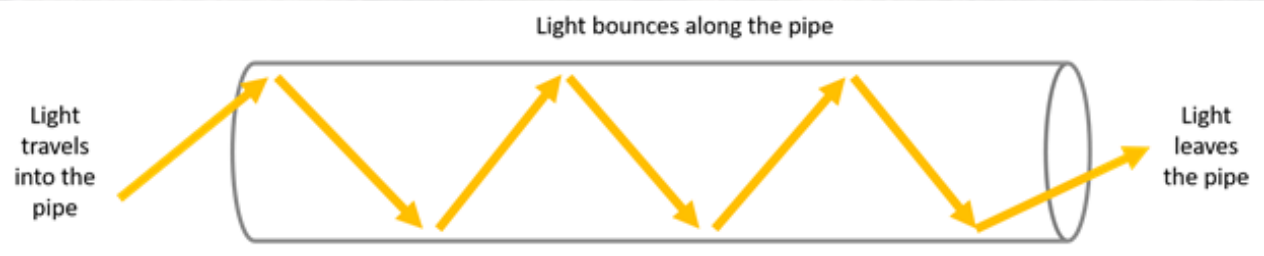
Take part by conducting this experiment at home. Take photos or make a video, and share it on social media using the hashtag **#Tyndall200**. You can also share photos or a 30-second video using our online entry form. Either way you'll be entered to win a #Tyndall200 prize pack for science lovers!

BACKGROUND

Images that we see are made up of many rays of light, like pieces of a puzzle, that our eyes pick up and put them together into a picture. Light can bounce off an object and travel directly back to your eyes. This is called **reflection**. Sometimes light meets another object and bounces in a different direction. This is called **refraction**.

We can use light to send information from one place to another. John Tyndall is known as the grandfather of fiber optics. John Tyndall's Light Pipe experiment showed that light will travel along a path of a stream of water. This is because the light will bounce from one side of the stream to another until it reaches the end of the water.

This is called **Total Internal Reflection**. Fiber optic cables are long tubes of glass which allow light to bounce down the tube, transferring the light from one end to another. We can turn information into light and can send this through a fiber optic cable, as with broadband.



THE EXPERIMENT

This experiment shows how reflection and refraction work.

YOU WILL NEED:

- Glass cup
- Jug of tap water
- Coin, e.g. €1

WHAT TO DO:

1. Place the coin on a table.

2 Place the empty glass on top of the coin.

3 Pour the water from the jug into glass.

4 Look at the full glass of water from the side...

5 **Where did the coin go?!**

EXPERIMENT NOTEBOOK

SCIENTIST NAME: _____

AGE: _____ EXPERIMENT DATE: _____ TIME: _____

Try changing the direction you look into the glass. What do you see?

1 When I look through the glass at **eye level** I see...

This is called: _____

2 When I look through **the top** of the glass I see...

This is called: _____

3 When I look **downwards** through the side of the glass, I see...

This is called: _____

WHAT YOU WILL SEE:

When your head is level with the table, and your eyes are level with the glass of water, you'll notice the coin disappears! The water **refracts** (slightly bends) the room light coming through the glass and into the water, making the coin look like it has been moved, or in this case the coin looks like it has disappeared!

ANSWER KEY:

1: When I look through the glass at **eye level**, I see **no coin**. This is called **refraction**.
2: When I look through the **top** of the glass, I see **one coin**. This is called **reflection**.
3: When I look **downwards** through the side of the glass, I see **two coins**. This is called **reflection**.

DID YOU KNOW?

There are millions of fiber optic cables that stretch across the world, mostly underwater. One of the largest cables is FLAG (Fiber Optic Link Around the Globe) which stretches 28,000km or 17,398 miles. It connects places across the world including the UK, Japan and India.

John Tyndall (1820 - 1893) was one of Ireland's most successful scientists and educators. Born in Leighlinbridge, County Carlow, he reached the pinnacle of 19th century science. His major scientific interest was the interaction of light with matter, and he is most widely known for the explanation of why the sky is blue. Tyndall National Institute, Ireland's leading ICT research institute, is named in recognition of his work.

Image: Carlow County Museum