ALL NOBEL PRIZES 2018

Nobel Prize Lessons
The Nobel Prize
Since 1901

To those who, during the preceding year, shall have conferred the greatest benefit to humankind.

Alfred Nobel (1833-1896)
The Nobel Prizes 2018

Physics Prize: tools made of light

Chemistry Prize: production of new enzymes and antibodies

Medicine Prize: cancer treatment

Literature Prize: not awarded in 2018

Peace Prize: combating war crimes

Prize in Economic Sciences: Integrating nature and knowledge into economics
Physics Prize 2018

A tool for using laser light to capture and manipulate particles, and a method for creating very strong, rapid laser pulses.

Arthur Ashkin
Born: 1922, USA

Gérard Mourou
Born: 1944, France

Donna Strickland
Born: 1959, Canada
Optical tweezers

Using a laser beam to move and capture objects.

Ashkin creates his light trap

1. Small transparent spheres are set in motion when they are illuminated with laser light. Their speed corresponds to Ashkin’s theoretical estimation, demonstrating that it really is radiation pressure pushing them.

2. One unexpected effect was the gradient force that pushes the spheres towards the centre of the beam, where the light is most intense. This is because the intensity of the beam decreases outwards and the sum of all the forces pushing the spheres sends them towards its centre.

3. Ashkin makes the spheres levitate by pointing the laser beam upwards. The radiation pressure counters gravity.

4. The laser beam is focused with a lens. The light captures particles and even live bacteria and cells in these optical tweezers.

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Speeding up pulsing laser light

A short, intensive pulse is stretched, amplified and then compressed, forming a short and much more intensive pulse.
Chemistry Prize 2018

Methods for producing useful new enzymes and antibodies.

Frances H. Arnold
Born: 1956, USA

George P. Smith
Born: 1941, USA

Sir Gregory P. Winter
Born: 1951, United Kingdom
Directed evolution of enzymes

Enzymes developed by means of directed evolution are used in making everything from biofuel to pharmaceuticals.
Antibodies as medicines

Antibodies can be produced by means of directed evolution. These antibodies can be used as pharmaceuticals that combat certain diseases.
Medicine Prize 2018

This year’s Laureates discovered and developed a new method for curing cancer.

James P. Allison
Born: 1948, USA

Tasuku Honjo
Born: 1942, Japan
Cancer

Cancer cells divide uncontrollably and form tumours.
Immune checkpoint therapy

Treatment of cancer by releasing the brakes in our immune system.
Peace Prize 2018

“for their efforts to end the use of sexual violence as a weapon of war and armed conflict”

Denis Mukwege
Born: 1955, DR Congo

Nadia Murad
Born: 1993, Iraq
Denis Mukwege

Many years of work – at the risk of his own life.
Nadia Murad

She was a prisoner of Islamic State – today she is fighting to help others.
Prize in Economic Sciences 2018

 Integrating nature and knowledge into economics

William D. Nordhaus
Born: 1941, USA

Paul M. Romer
Born: 1951, USA
The market and technological change

Monopolies and technological changes that harm nature can be controlled with the help of regulations that lead to sustainable growth.
Climate change and the economy

Depending on what choices we make, the consequences on the climate will vary.
Awarding the Nobel Prize

On December 10 each year, the Nobel Prize is presented.
FOR THE GREATEST BENEFIT TO HUMANKIND