PHOTONICS AS AN INDUSTRY SECTOR

Within a few decades, the term photonics has developed from a technical term, used in research, to an industry term that encompasses all technical applications of light.

From the 1960s
Photons are researched as an alternative to electrons for circuitry tasks. The term Photonics is coined in connection with this.

Invention of the laser

Leading US industry magazine changes its name from Optical Spectra to Photonics Spectra
Within a few decades, the term photonics has developed from a technical term, used in research, to an industry term that encompasses all technical applications of light.

- 1965: Photons are researched as an alternative to electrons for circuitry tasks. The term Photonics is coined in connection with this.
- 1975: Leading German industry magazine changes its name from LaserOpto to Photonik.
- 1985: European Commission defines photonics as key technology.
- 1990: Foundation of the American National Photonics Initiative to promote photonics in the US.
- 2000: In the context of the high-tech strategy for Germany, photonics replaces the term of “optical technologies” which had been used so far.
- 2010: Leading German industry magazine changes its name from LaserOpto to Photonik.
- 2015: Foundation of the American National Photonics Initiative to promote photonics in the US.
- 2020: European Commission defines photonics as key technology.
Photonics is a global industry today. This graphic shows the strongest market segments in each region.

Global market share in the market segment (information in %)
To emphasize regional strengths, only market shares of more than 10% are shown.

Market segments:
- production technology
- image processing & metrology
- security & defense technology
Photonics is a global industry today. This graphic shows the strongest market segments in each region.

- **US & CANADA:**
  - Medical technology & life science
  - Information technology
- **Europe:**
  - Medical technology & life science
  - Communication technology
  - Displays
- **China:**
  - Medical technology & life science
  - Communication technology
  - Displays
  - Light sources
- **Taiwan:**
  - Medical technology & life science
  - Communication technology
  - Displays
- **South Korea:**
  - Medical technology & life science
  - Communication technology
  - Displays
  - Light sources
- **Japan:**
  - Medical technology & life science
  - Communication technology
  - Displays
  - Light sources

To emphasize regional strengths, only market shares of more than 10% are shown.
Nobel laureates with a connection to photonics since the invention of the laser in 1960

**NUMBER OF LAUREATES**
by country at the time of the award ceremony

1. Russia (RU)
2. Soviet Union (SU)
2. Japan (JP)
2. Great Britain (GB)
3. France (FR)
3. Germany (DE)
17. US

**Nobel laureates with a connection to photonics since the invention of the laser in 1960**

- Charles H. Townes (US)
- Nicolay G. Basov (SU)
- Aleksandr M. Prokhorov (SU)
- quantum electronics for the construction of the maser and laser
- Alfred Kastler (FR)
- optical pumping
- Dennis Gabor (GB)
- holography
- Nicolaas Bloembergen (US)
- Arthur L. Schawlow (US)
- laser spectroscopy
- Ernst Ruska (DE)
- electron microscope
- John Lewis Hall (US)
- Theodor Hänsch (DE)
- high-precision laser spectroscopy

**RESEARCH & ECONOMY**

46 Nobel laureates with a connection to photonics since the invention of the laser in 1960

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NOBEL LAUREATES

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Nobel laureates with a connection to photonics since the invention of the laser in 1960

- **1965**
  - Charles H. Townes (US)
  - Nicolay G. Basov (SU)
  - Aleksandr M. Prokhorov (SU)
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- **1970**
  - Alfred Kastler (FR)
  - optical pumping

- **1975**
  - Nicolaas Bloembergen (US)
  - Arthur L. Schawlow (US)
  - laser spectroscopy

- **1980**
  - Ernst Ruska (DE)
  - electron microscope

- **1985**
  - Steven Chu (US)
  - Claude Cohen-Tannoudji (FR)
  - William D. Phillips (US)
  - cooling and capturing of atoms with laser beams

- **1990**
  - Roy Jay Glauber (US)
  - quantum optics

- **1995**
  - Charles Kuen Kao (GB)
  - communication via glass fibers

- **2000**
  - Sergei Haroche (FR)
  - David J. Wineland (US)
  - quantum optics, laser cooling and frequency standards

- **2005**
  - Willard Boyle (US)
  - George Elwood Smith (US)
  - CCD Sensors

- **2010**
  - Wolfgang Ketterle (US)
  - Carl E. Wieman (US)
  - Eric A. Cornell (US)
  - creation of a Bose-Einstein condensate with laser cooling

- **2015**
  - John Lewis Hall (US)
  - Theodor Hänsch (DE)
  - high-precision laser spectroscopy

- **2020**
  - Roy Jay Glauber (US)
  - quantum optics

- **2025**
  - Eric Betzig (US)
  - William E. Moerner (US)
  - Stefan W. Hell (DE)
  - super-resolved fluorescence microscopy

- **2030**
  - Isamu Akasaki (JP)
  - Hiroshi Amano (JP)
  - Shuji Nakamura (US)
  - blue LEDs

**Number of laureates by country at the time of the award ceremony**
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- Soviet Union (SU)
- Russia (RU)
The highest density of photonics professionals are found in Europe and East Asia.

Number of photonics professionals in relation to the total workforce of the country (a.u. USA = 100)
Business-oriented social media reveal where photonics-savvy professionals got their education.
ECONOMIC IMPACT OF PHOTONICS

Data suggests that there were approximately 2.32 million jobs in photonics in 2015.