# Topical Issue celebrating the 40th anniversary of Applied Physics B - editorial

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In 1981 the Springer-Verlag *Applied Physics* journal was split into two parts due to the breadth in the application-oriented research being published therein [1]. Part A was to cover *Solids and Surfaces*, that being solid materials, preparation, and modification methods, whilst Part B, *Photophysics and Laser Chemistry*, was to be devoted to optical radiation and interactions with gases and liquids.

Some 13-years later, the technological advances, especially in lasers as a novel key technology, shifted the emphasis for Part B to *Lasers and Optics*, fostering a physical rather than chemical focus for optical-radiation generation, manipulation, and application, more in line with the core values of the journal and its readership.

Since that change of name in 1994 to *Applied Physics B: Lasers and Optics* (APB), the journal has continued to chart, not only the rise in laser powers and expansion in frequency bands through utilisation of the three phases of matter for gain and non-linear media, but also new techniques that broadened the parameter space for applications of light. These rendering lasers as a cornerstone technology of the 21st century. Hence, and keeping true to the founding photophysics-applications remit, APB continues to strive to capture the latest trends and advancements in the science of photons, encompassing the generation of single-photon quantum states through to extreme light conditions, developments in precision characterisation techniques for spectroscopy, imaging, and metrology applications; and the realisation of optical devices for manipulating and exploiting light’s extraordinary qualities.

To celebrate the 40th anniversary of *Applied Physics B,* the most cited and influential authors from the journal’s history were invited to contribute perspective papers on the developments of their fields of interest following on from their original highly impactful papers. The selection of papers in this topical issue therefore cover a broad remit, from: fundamental properties of photons [2-4]; the development of new and old active and non-linear media [5-7]; the humble optical cavity [8] — whose importance is often overlooked, even in the acronym LASER (Light Amplification by Stimulated Emission of Radiation), for which the device (Laser) itself is inextricably dependent; a review on the advances in scaling power and brightness of solid-state lasers [9]; understanding and exploitation of photon-induced material responses [10-14]; and advances in terahertz imaging techniques [15].

I am extremely grateful to the authors for taking the time to prepare this fabulous collection, which is packed full of foundational concepts through to frontier demonstrations that I am confident will be a great resource for scientists in the field for many years to come. Perhaps a milestone to look back on in another 40 years, around the centenary of the first demonstration of the Laser, to take stock of how much more we have learnt about light and its uses.

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