

More to rainbows than meets the eye

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In-depth review charts the scientific understanding of rainbows and highlights the many practical applications of this fascinating interaction between light, liquid and gas.

There's more to rainbows than meets the eye. Knowledge gained from

studying these multicoloured arcs of scattered light can be incredibly useful in ways that may not immediately spring to mind. Rainbow effects can warn of chemical contamination in the atmosphere, help to develop more efficient combustion engines and possibly even provide insight into the mechanics of reinforced concrete.

Writing in *European Journal of Physics*, Alexander Haußmann of the Institute of Applied Physics at the Technical University of Dresden, Germany, has reviewed the latest developments in the field of rainbow research. His article takes a comprehensive look at natural rainbows and touches on the many practical applications of this fascinating interaction between light, liquid and gas.

Haußmann has been studying rainbows for more than 20 years. His interest began at school where he and his friends would log meteorological data for fun to keep tabs on changes in the weather. Today, weather watching has become more sophisticated with the introduction of techniques such as radar [remote sensing](#), but observing rainbows remains important. As Haußmann points out, these patterns of [scattered light](#) can provide considerable clues to the size distribution and shape of raindrops falling during wet weather. If paired with radar data, this information could be used to quantify the amount of rainwater reaching the ground. "If our analysis methods are precise enough, we can turn rainbows into [optical remote sensing](#) tools to study the physics of rain," he comments.

Haußmann's review delves deep into the challenges of simulating rainbows as mathematical modeling is an important tool in furthering our understanding of this field. There are some key points that add to the puzzle. "Rain drops are not exactly spherical, but become deformed into slightly flattened 'hamburger bun' shapes due to air drag as they fall through the sky," he explained. "This has a drastic influence on the appearance of rainbows and makes scattering calculations numerically

very demanding."

As well as focusing on the science, the article also provides tips for capturing [rainbows](#) on camera, which could help to win bragging rights on Instagram and other popular photo-sharing websites. "Rainbows are short-lived and special phenomena such as twinned bows are pretty rare, so it's important to always have your camera to hand," recommends Haußmann. "This can be a smartphone or, in my case, an SLR camera with a fisheye lens to capture the full width of a rainbow in a single frame."

More information: "Rainbows in nature: recent advances in observation and theory" Alexander Haußmann 2016 *Eur. J. Phys.* 37 063001 , [DOI: 10.1088/0143-0807/37/6/063001](https://doi.org/10.1088/0143-0807/37/6/063001)

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