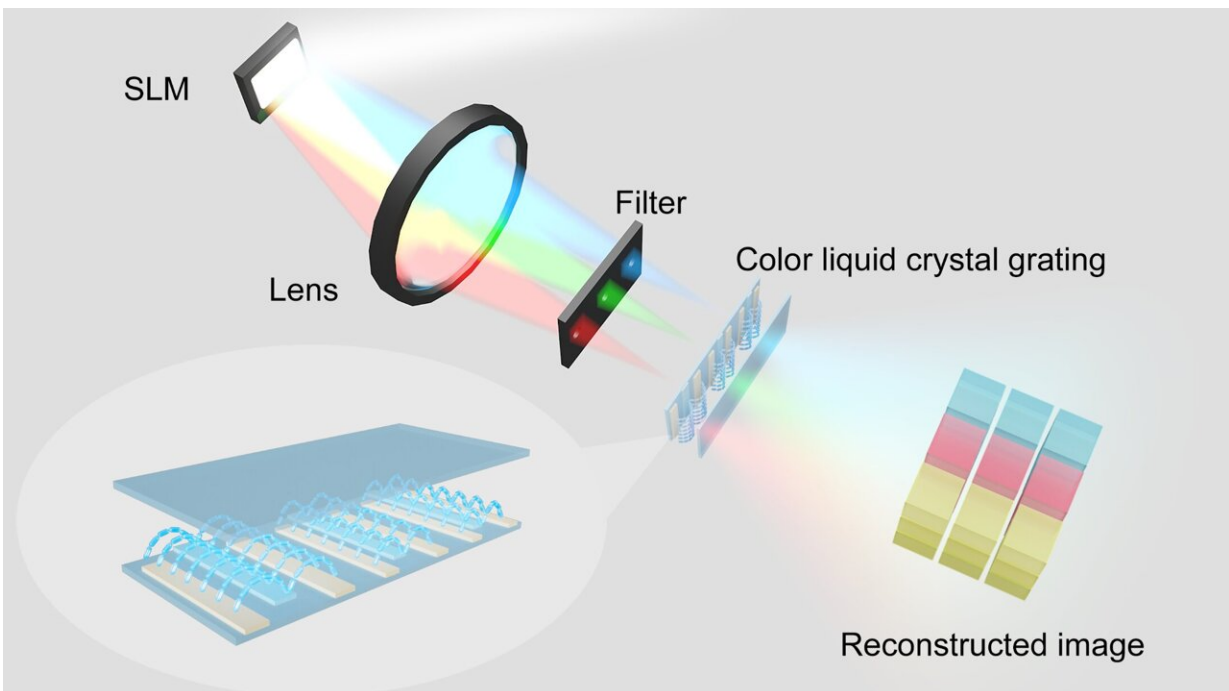


Study presents a paradigm for achieving desirable holographic 3D display

January 24 2024



The local enlarged image shows the specific structure of the color liquid crystal grating. Credit: Di Wang, Yi-Long Li, Fan Chu, Nan-Nan Li, Zhao-Song Li, Sin-Doo Lee, Zhong-Quan Nie, Chao Liu and Qiong-Hua Wang

Holographic display technology provides an ultimate solution for real 3D display and has great potential in augmented reality and virtual reality. However, the color and viewing angle of holographic 3D display mainly depend on the wavelength of the laser and the pixel size of the current

spatial light modulator.

Inevitable color differences and narrow viewing angles in conventional systems seriously affect the holographic display effect and hinder the application of holographic 3D display in many fields.

In a new [paper](#) published in *Light: Science & Applications*, a team of scientists, led by Professor Qiong-Hua Wang from Beihang University, China, and colleagues have developed a color liquid crystal grating based 3D display system with a large viewing [angle](#). The proposed system shows a color viewing angle of 50.12° , without any [chromatic aberration](#).

The researchers utilized a specially designed color liquid crystal grating with the same diffraction angle for incident RGB light to enlarge the viewing angle through secondary diffraction. The color liquid crystal grating has three different pitch regions in one liquid crystal cell, corresponding to [incident light](#) with different wavelengths, respectively.

Additionally, a chromatic aberration-free hologram generation method is proposed to cooperate with color liquid crystal grating to achieve a large viewing angle color display. Using the proposed system, 3D color objects can be vividly reconstructed without chromatic aberration and viewed from a large viewing angle.

The reported system solves the problems of a small [viewing angle](#) and serious chromatic aberration in the traditional holographic 3D display system, which has a decent display effect and broad application prospects in medical, industrial and other fields.

More information: Di Wang et al, Color liquid crystal grating based color holographic 3D display system with large viewing angle, *Light: Science & Applications* (2024). [DOI: 10.1038/s41377-023-01375-0](https://doi.org/10.1038/s41377-023-01375-0)

Provided by Chinese Academy of Sciences

Citation: Study presents a paradigm for achieving desirable holographic 3D display (2024, January 24) retrieved 27 April 2024 from <https://phys.org/news/2024-01-paradigm-desirable-holographic-3d-display.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.