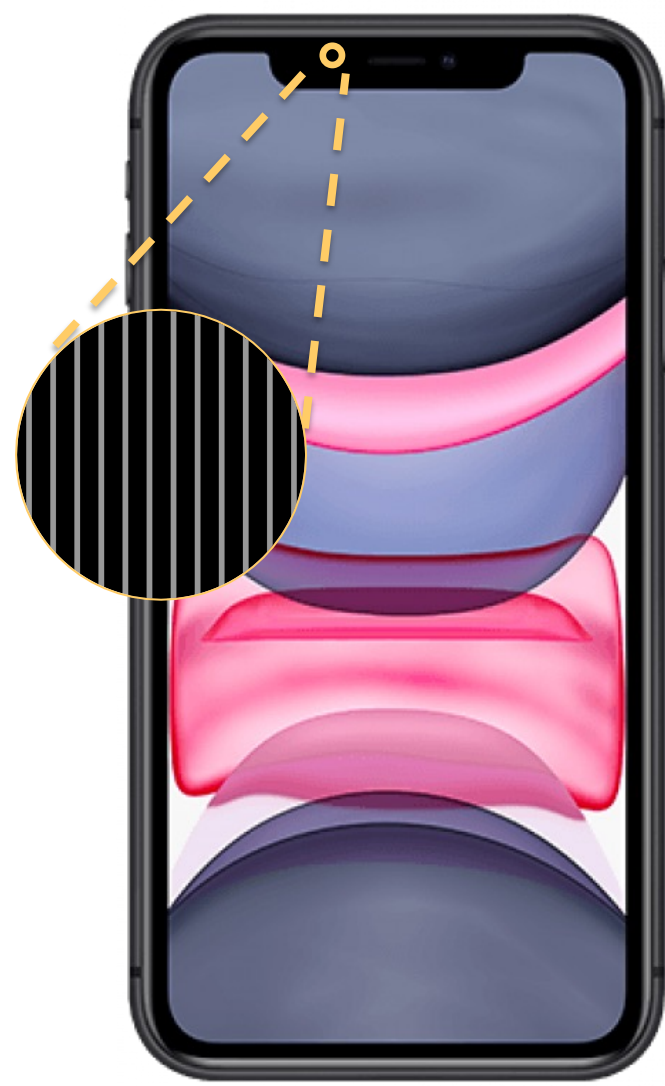


Under-Display Camera



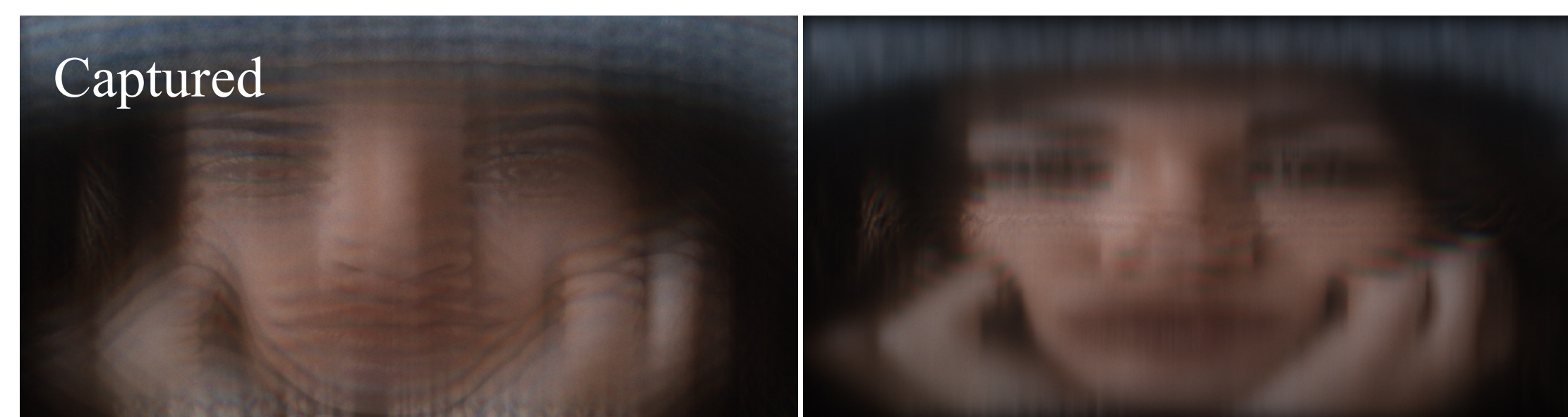
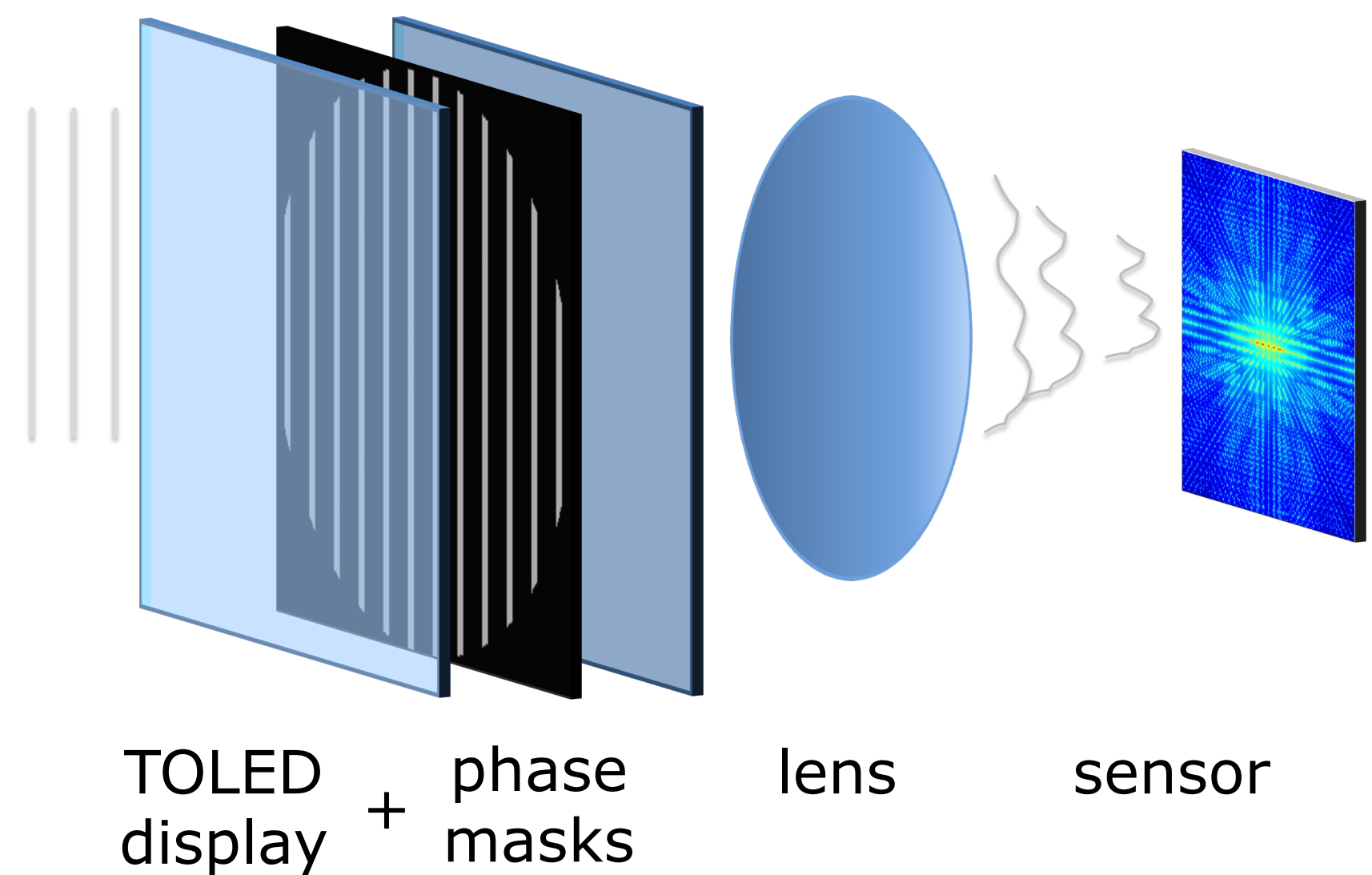
Under-display cameras provide an intriguing way to enable full screen devices. An under-panel camera is placed behind OLED displays and produces images through openings of the displays.

Key challenge:

1. TOLED display panels induce large diffraction blur.
2. Low Signal-to-Noise-Ratio.

Phase Mask Design Overview

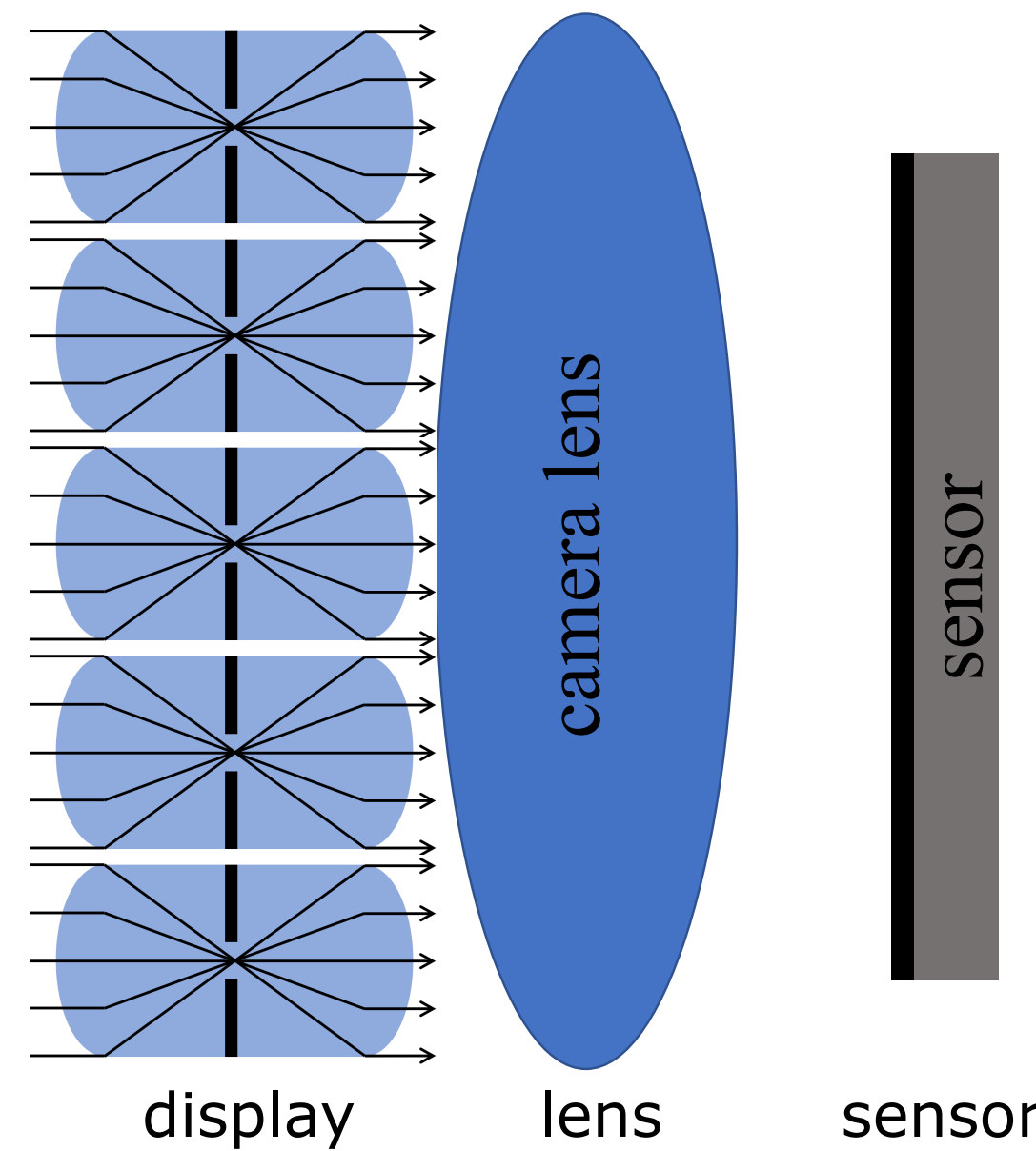
We propose to insert two **polarization-dependent microlens arrays (MLAs)** with **optimized heights**.



TOLED TOLED + phase masks

Phase Mask Design

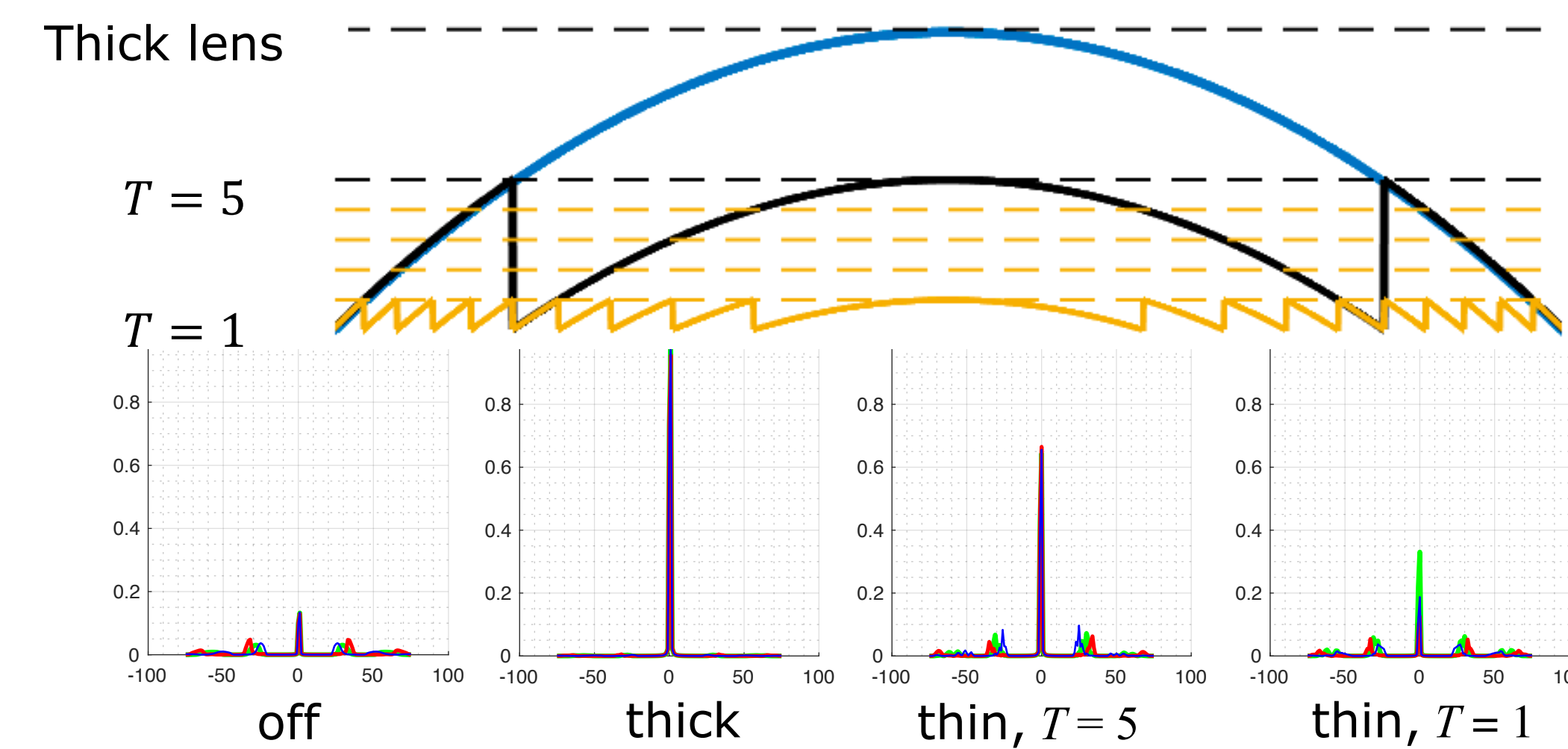
Insert two MLAs in front of and behind the display.



The first MLA concentrates light to the transparent regions of TOLED display, and the second MLA reverts the effect of the first MLA.

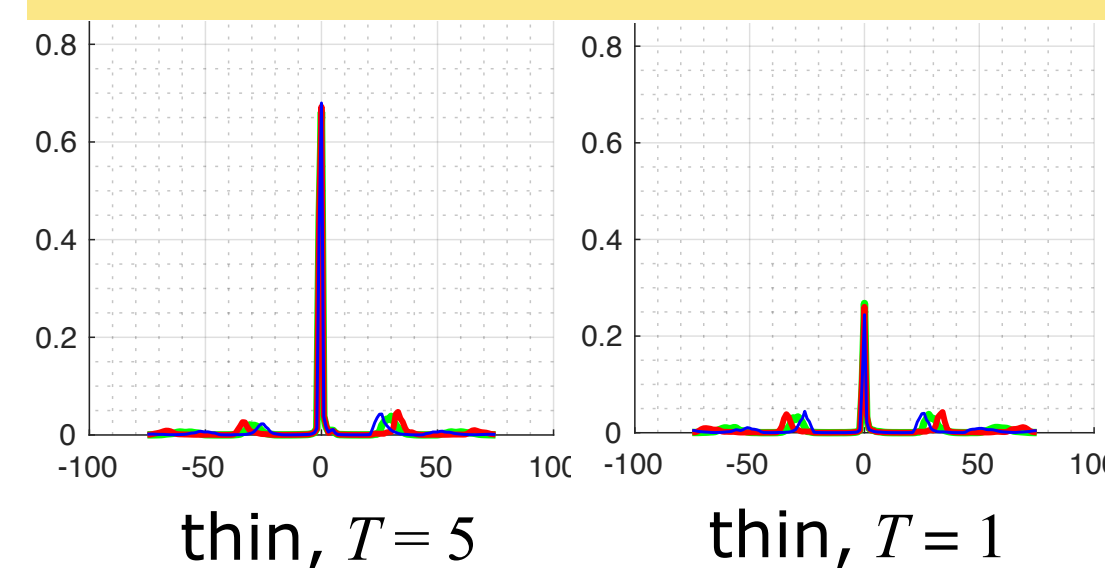
- Better light transmission
- More invertible PSFs

Fold MLAs into thin polarization-dependent phase masks.



This implementation ensures light emitting from the display is not modulation by the phase masks.

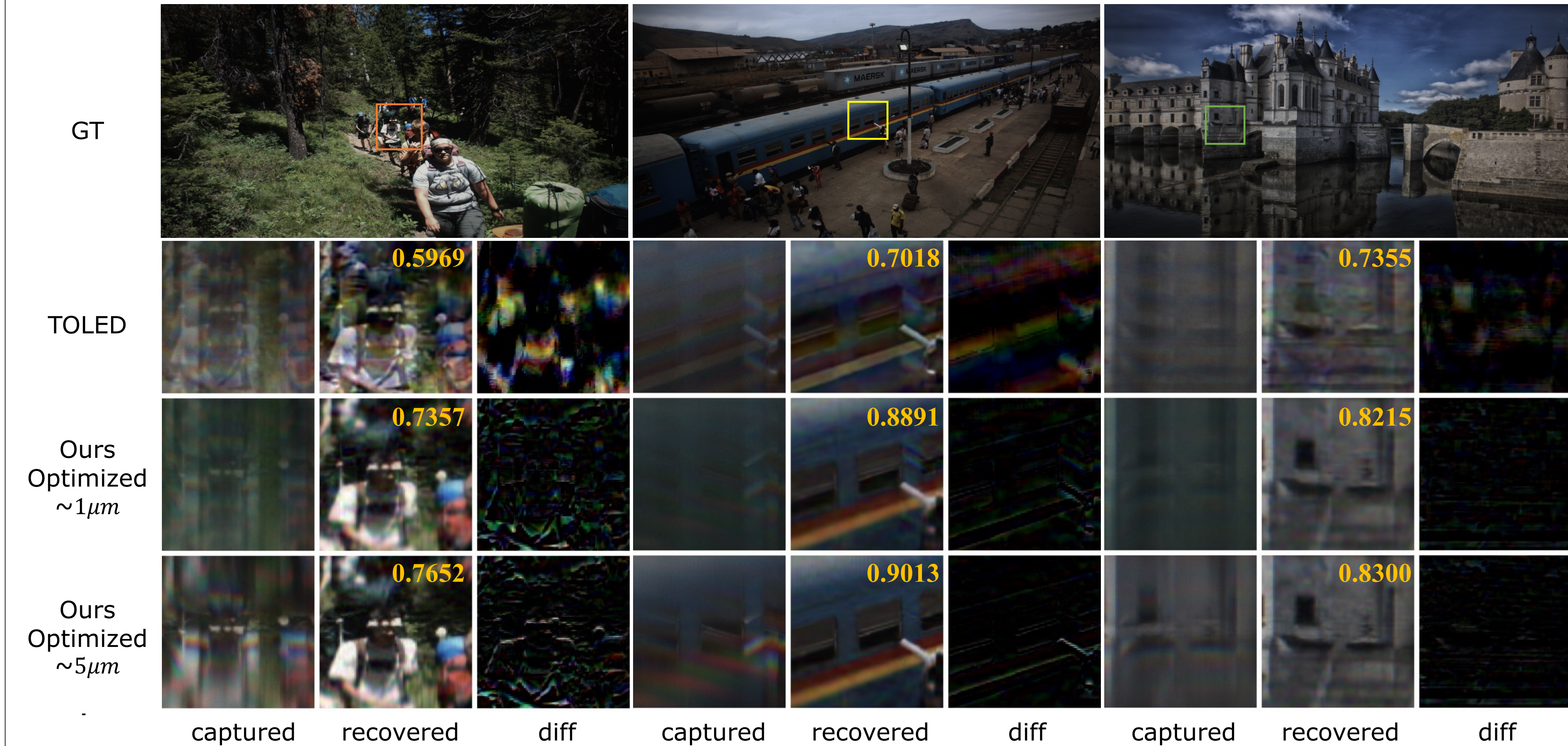
Optimize the height map of the phase masks.



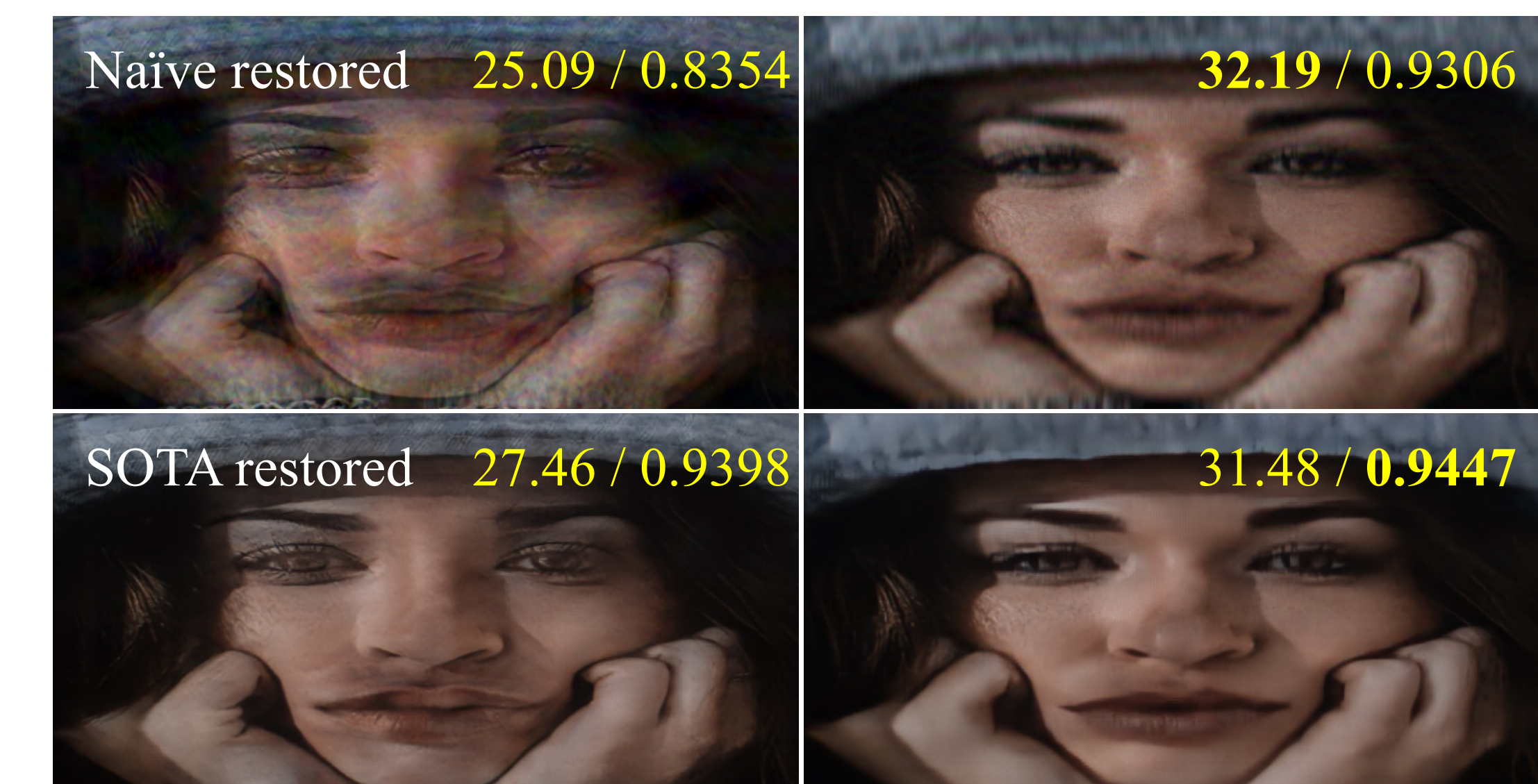
We further optimize the height map of the phase masks to improve the PSFs invertibility and suppress chromatic aberration.

Results

Qualitative results (TOLED vs. TOLED + phase masks)



Selfies (Naïve vs. SOTA deblurring)



TOLED TOLED + phase masks

