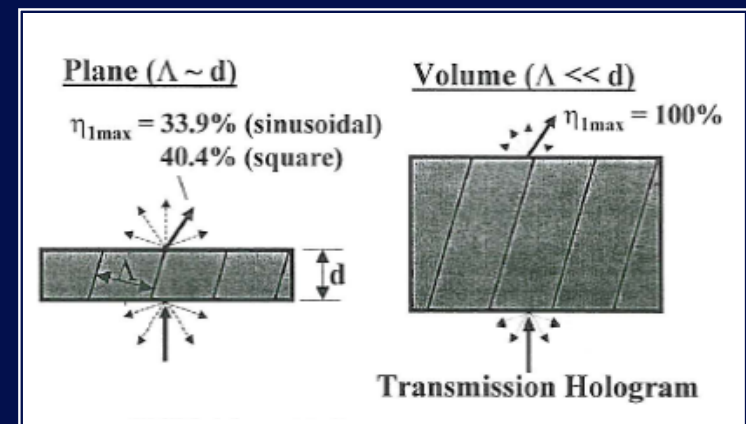
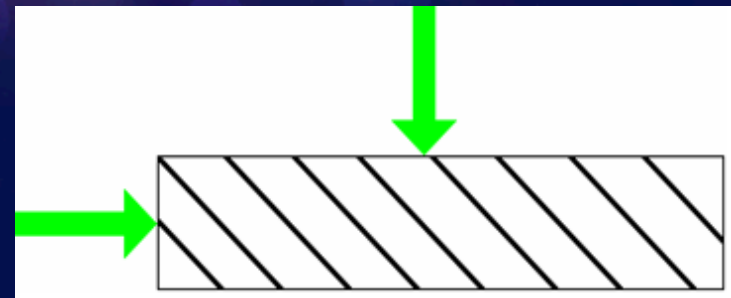
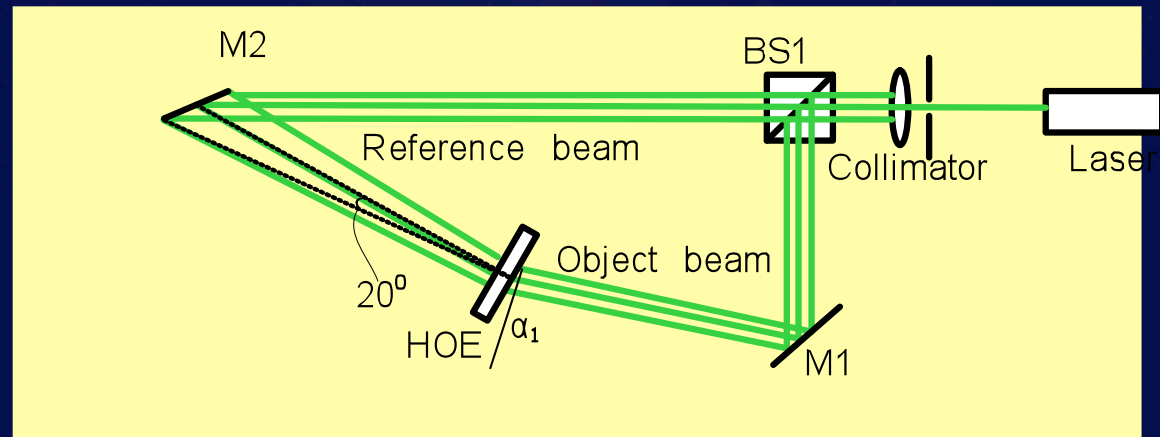
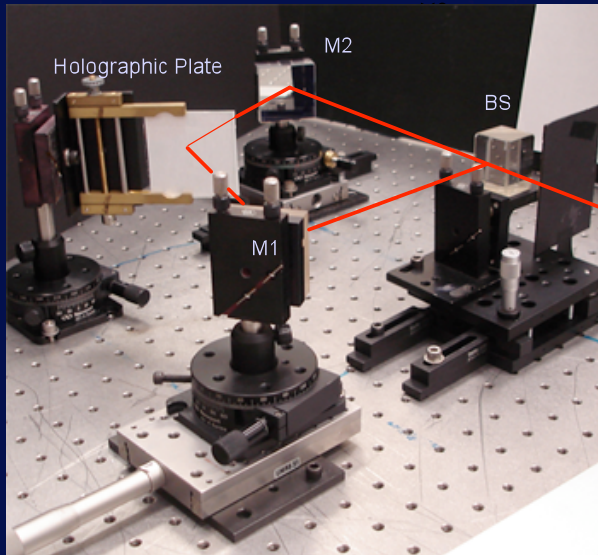


# Recording a VH Diffraction Grating

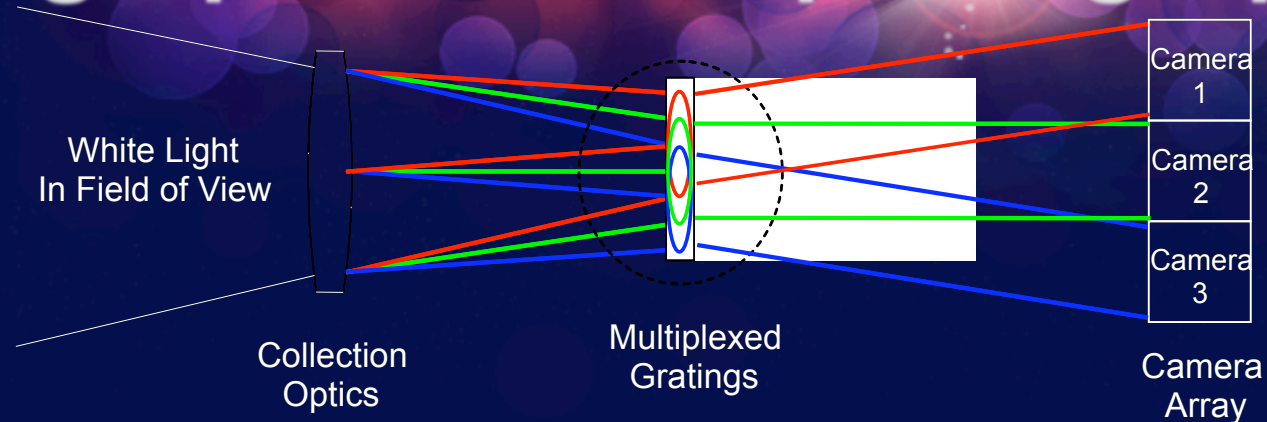
- Two optical beams create an interference pattern.
- Gratings allow for only single bandwidth to pass.
- Re-illumination with one write beam re-creates second write beam
- Large  $d/L \rightarrow$  beams pass through many fringes
- 100% Theoretical Throughput Efficiency



# Setup for recording of one color phase hologram: 2 Beam Reflection Geometry



# Holographic Beamsplitting Approach



## Current Approach uses Interference filters

Passes wavelength of interest/blocks all other wavelengths

One filter in front of each camera

Inefficient and uses multiple lens systems (1 for every camera)

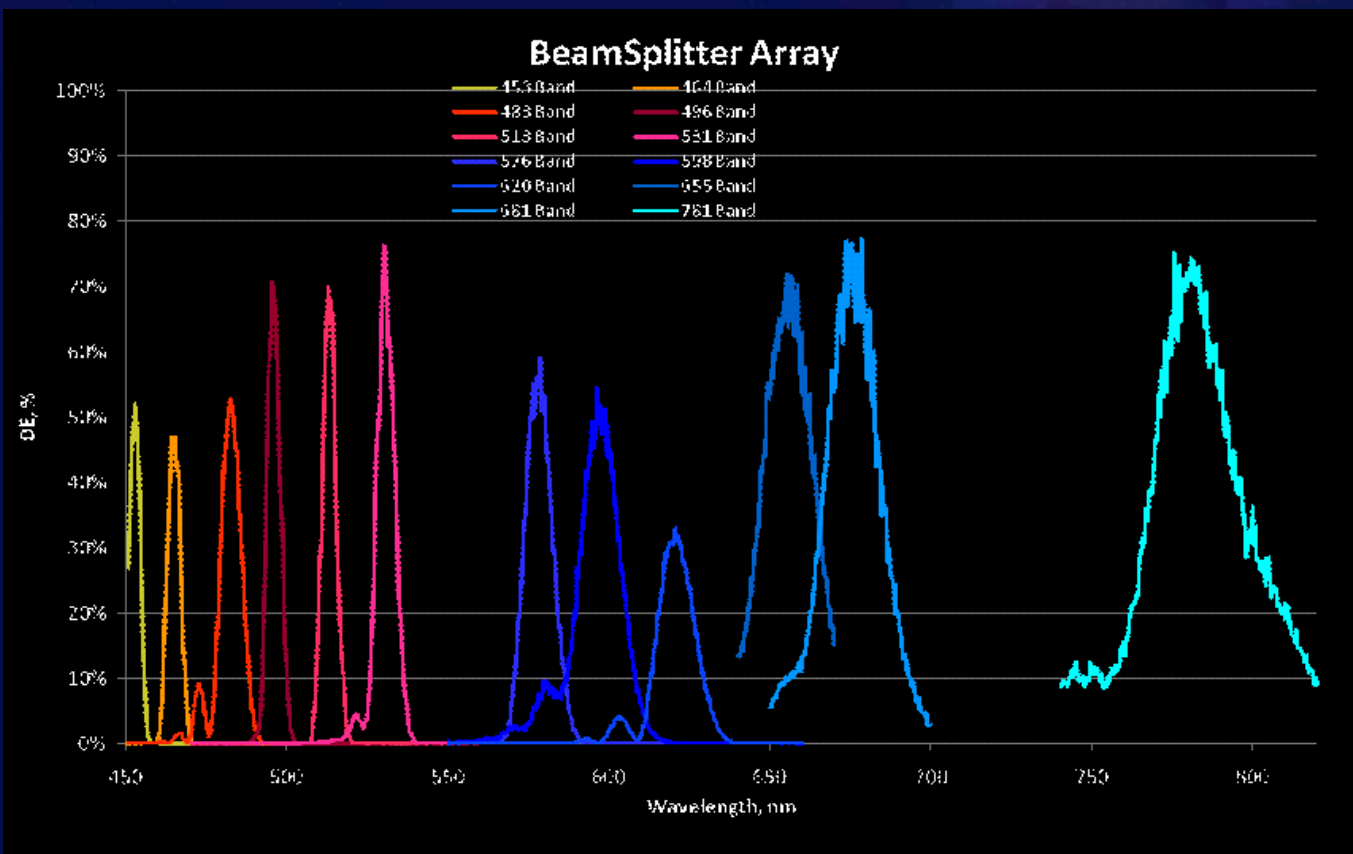
## Holographic Approach

Split the incoming white light

All light is captured

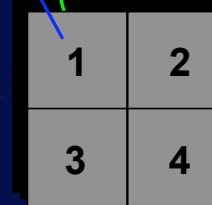
5-6x more efficient & single lens system with same zoom on all channels

# 12 channel beamsplitting element demonstrated



12 Camera Bank

1	1	1	2	2	2
3	3	3	4	4	4



Volume Holograms:  
Tri Multiplexed  
Quad Array



# 12 channel beamsplitting element demonstrated

## Beamsplitter Characteristics

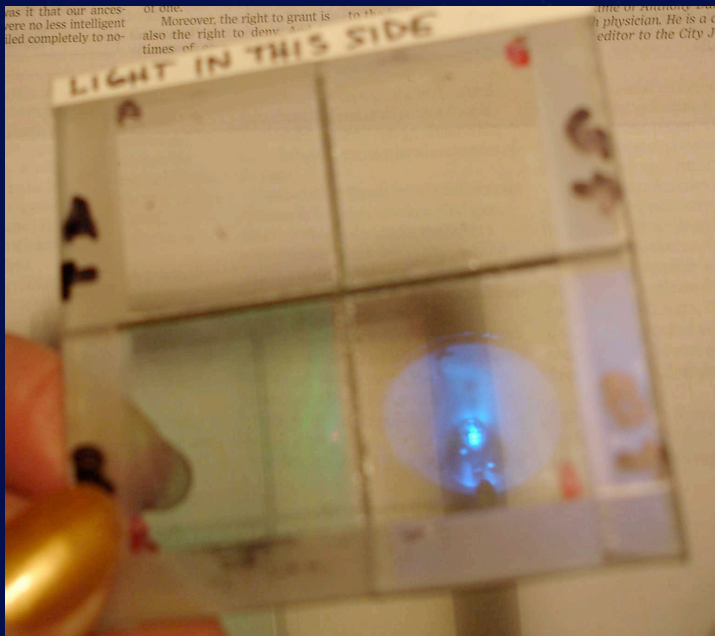
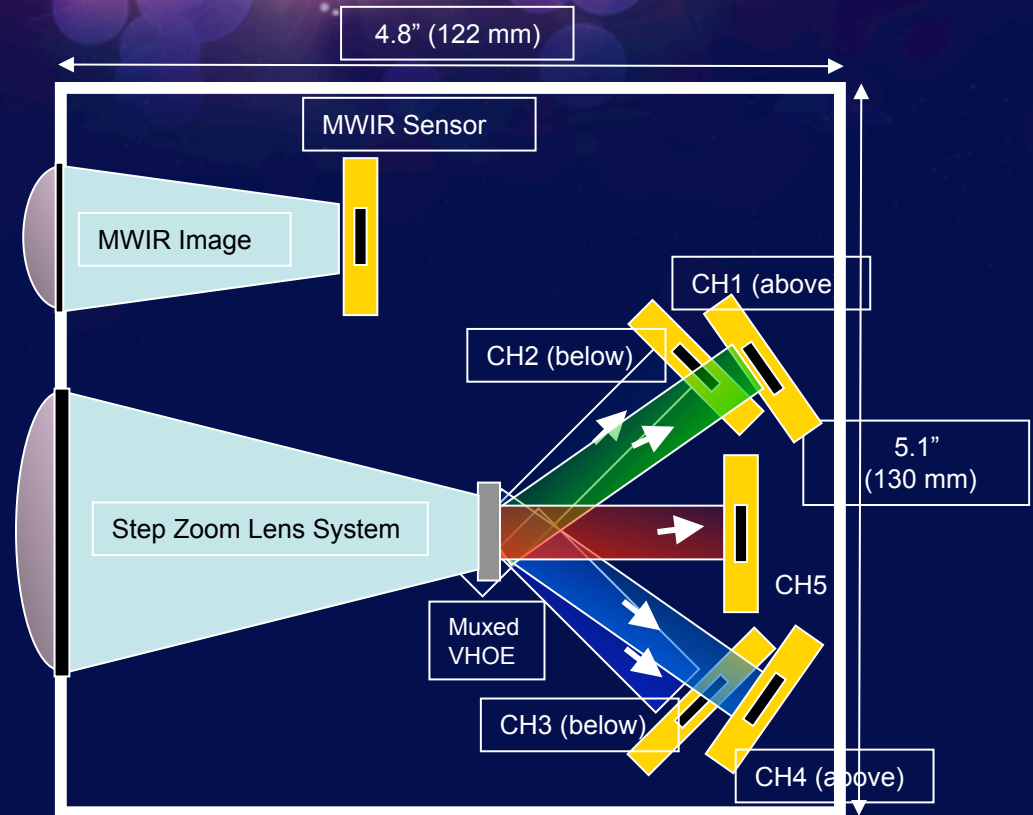
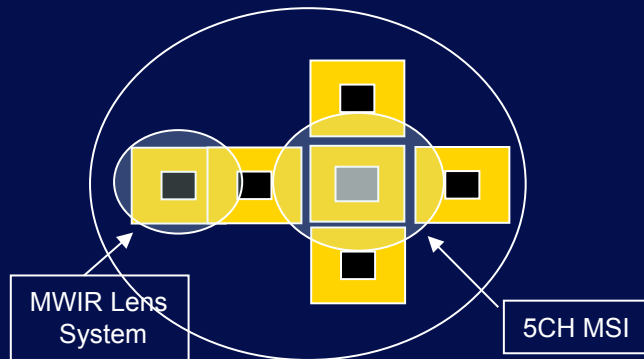


Photo. of 12 channel beamsplitter element

Operating spectrum:	450 – 800 nm
Number of spectral channels:	12
Spectral bandpass/channel:	15-25 nm,
Field of view of system:	20-25 deg.
Efficiency:	65-75%
Aperture of system:	2" x 2"
Aperture of each grating:	1/2" square
Out-of-Band rejection:	10 <sup>-2</sup>
Thermal stability range:	0 - 100° C

# 6 Channel MSI (4 underwater/1 surface) & MWIR

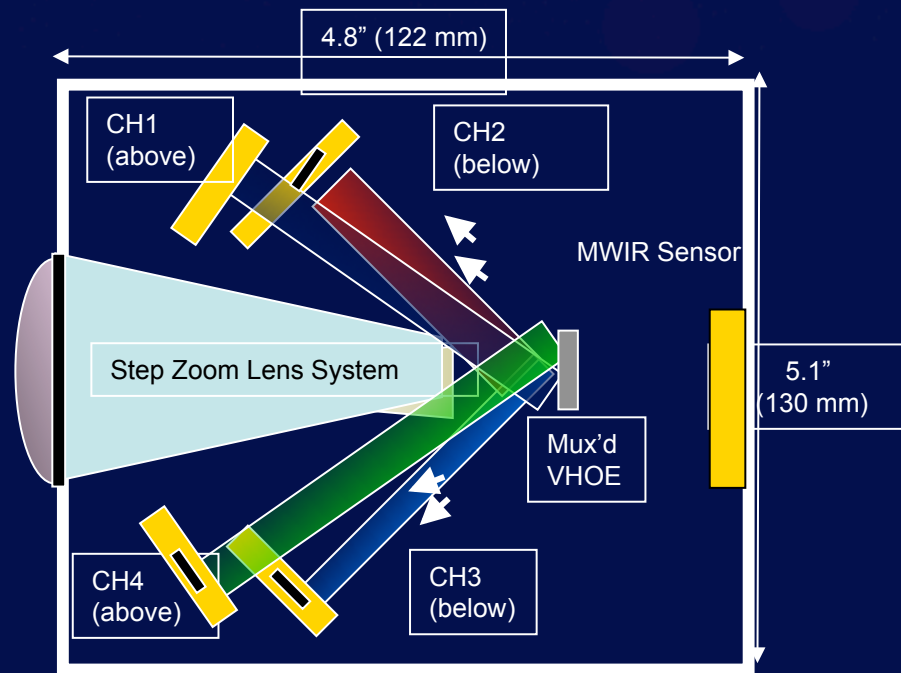
- 5 Channel MSI using multiplexed transmission volume holograms
  - 4 underwater channels (blue/green)
  - 1 surface channel (red) using non-diffracted light
- MWIR Channel
  - Separate lens/camera/system for MWIR images



Through the Lens

# 5 Channel MSI Design (3 underwater/1 surface) & MWIR

- Multispectral Imager using 4 volume multiplexed reflective holograms
  - 3 blue/green channels for underwater detection
  - 1 red channel for surface reflection
- MWIR Channel w/shared lens system



Cross-section

