



## Compact RGB Laser Module for AR Smart Glasses

SPIE. AR|VR|MR | 31<sup>st</sup> March 2021 | Stefan Morgott

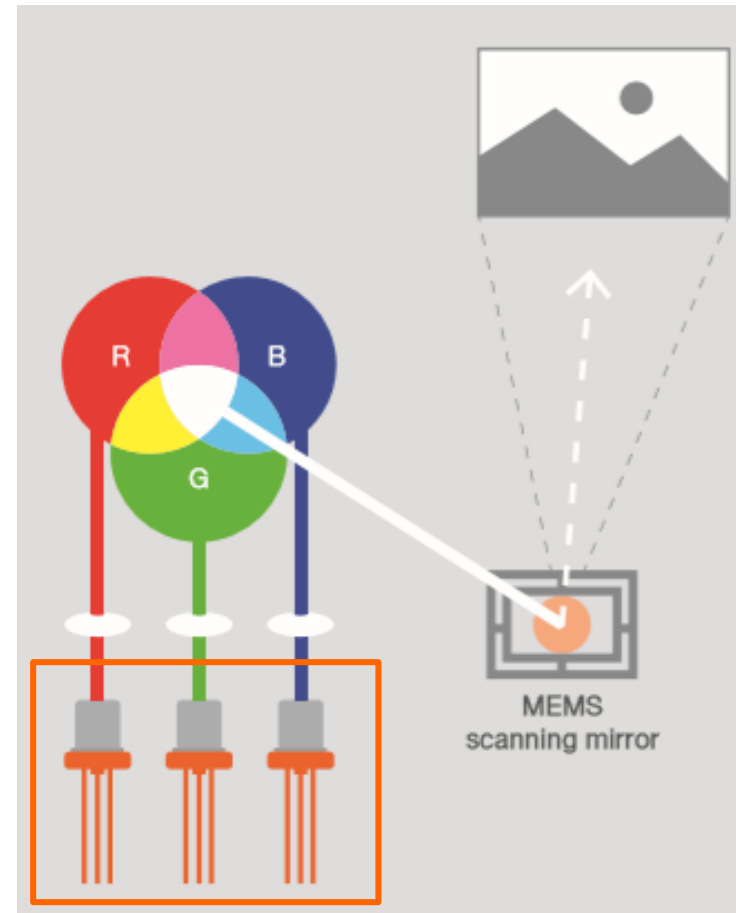
Light is OSRAM

**OSRAM**  
Opto Semiconductors

# Laser Beam Scanning (LBS)

Laser Beam Scanning requires

- Set of R/G/B single mode laser diodes
- Beam forming optics
- MEMS scanning mirror(s)

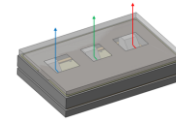


# AR Smart Glasses

## Prio #1 is Size / Weight / Esthetics

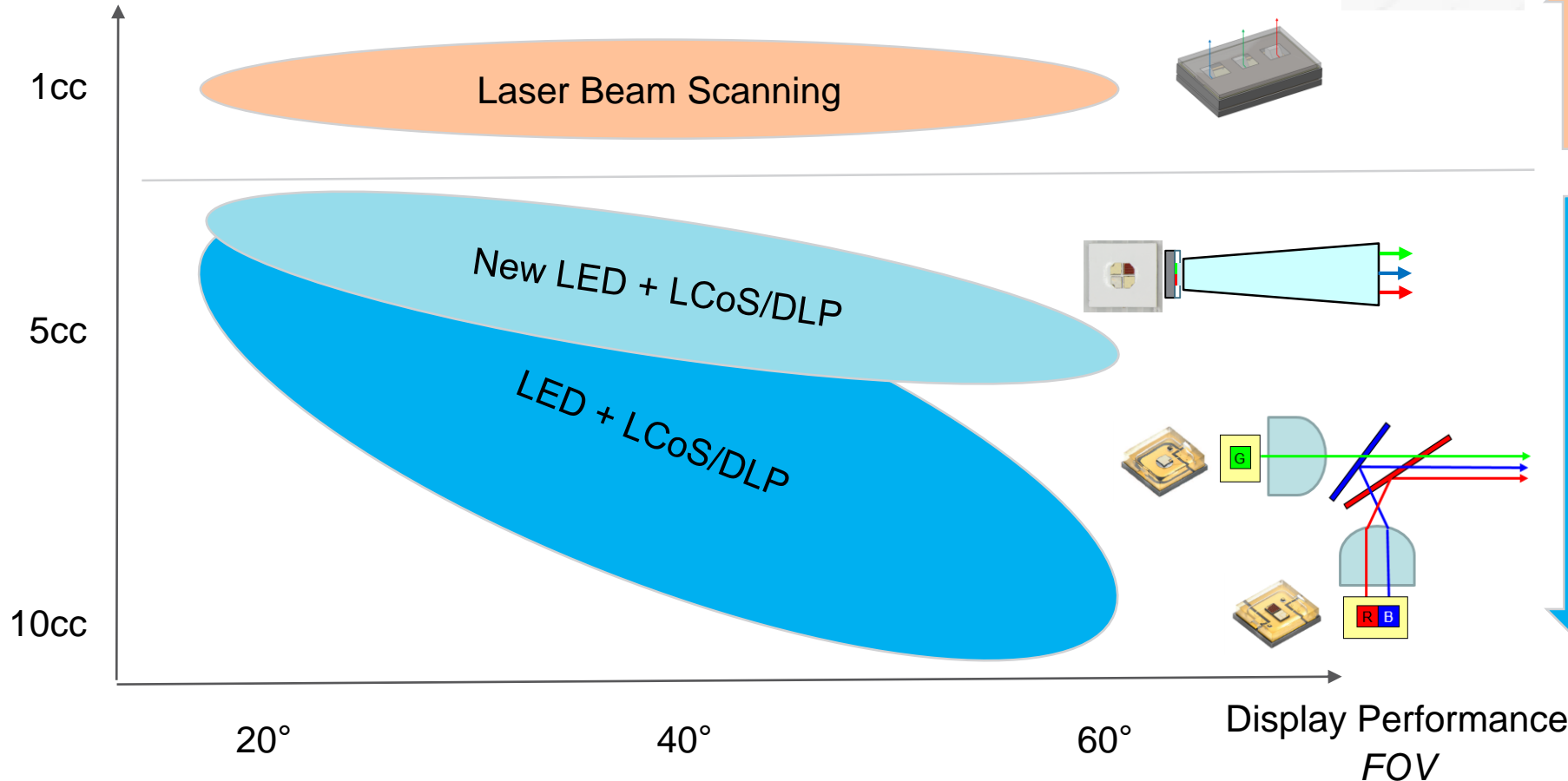
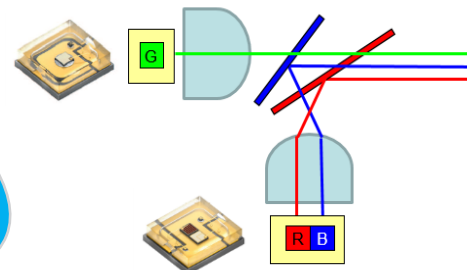
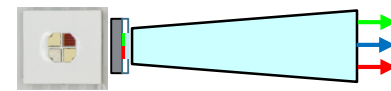
Compactness  
Optical Engine Size

Sugar Cube Size  
Optical Engine



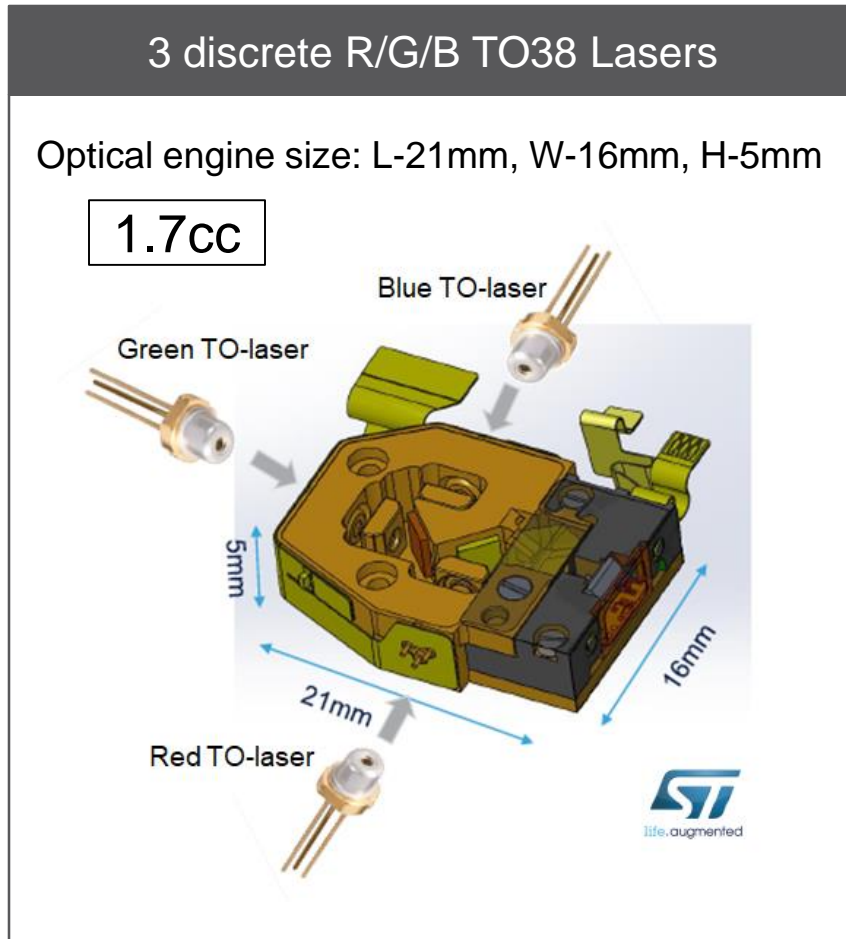
necessary for  
Consumer Glasses

acceptable for  
Professional/  
Industrial/  
Enterprise  
Glasses & Headsets

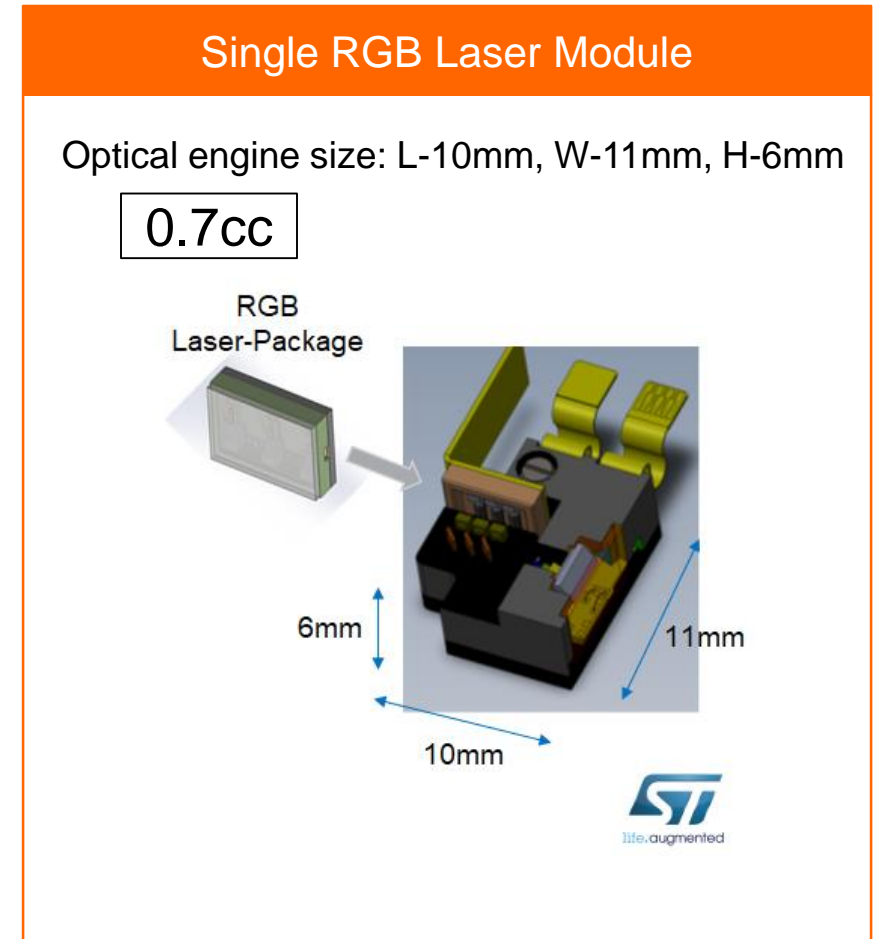


# RGB Laser Module

## Optical Engine Size <1cc

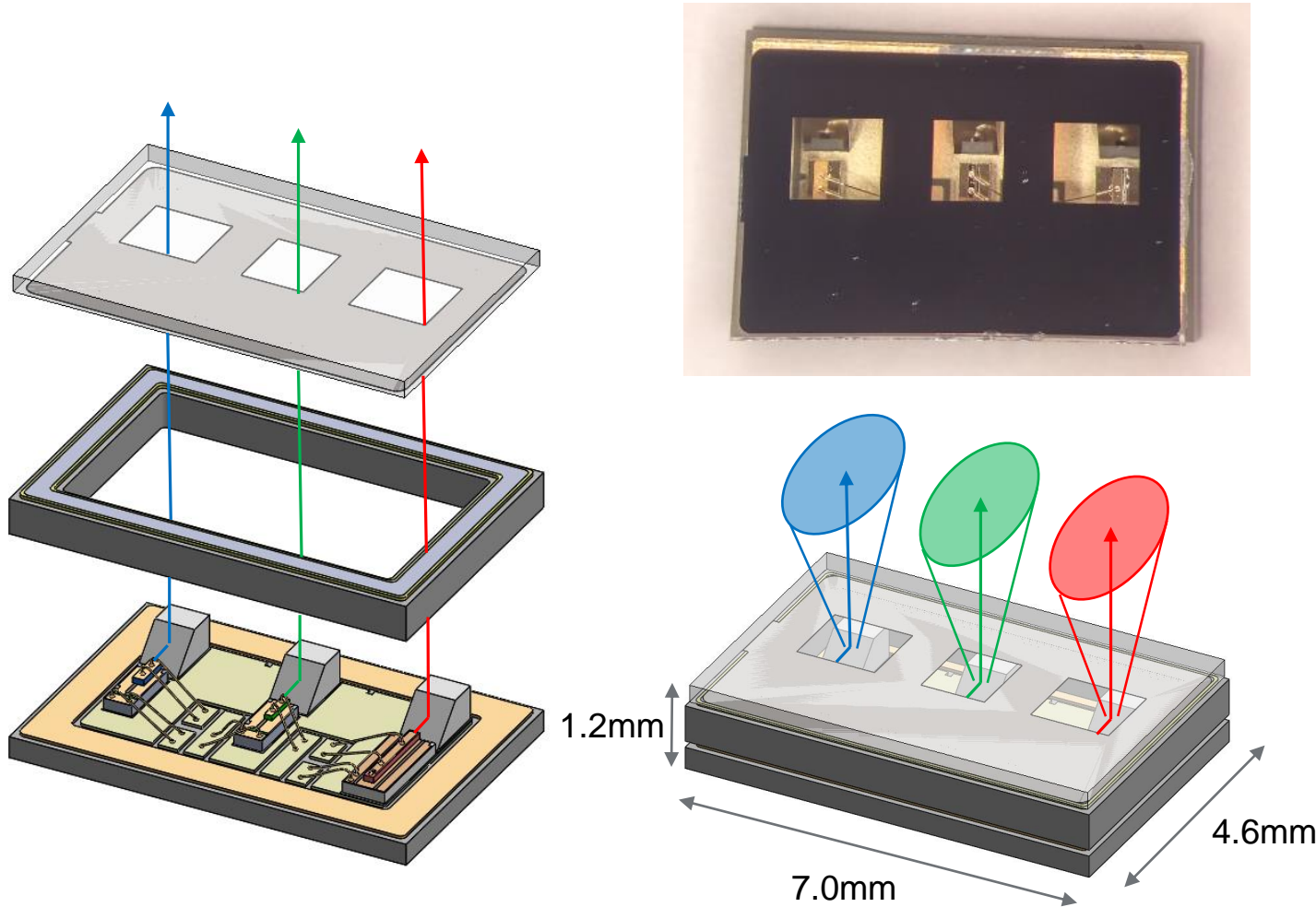


significant size benefit



# VEGALAS™ RGB

## Laser Module Characteristics



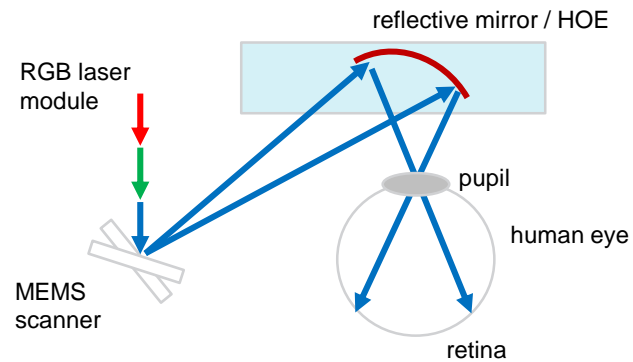
Parameter	Specification
Package Type	SMD Top-looker Hermetically sealed
Dimensions	7.0 x 4.6 x 1.2 mm
Laser diodes	1 Chip-on-Submount per color
Wavelength for R/G/B	640nm / 520nm / 450nm
Optical power for R/G/B	100mW / 50mW / 80mW
Laser diode spacing	2.3mm
Beam divergence (FWHM)	7° x 22° per color
Optics	<ul style="list-style-type: none"> <li>• Prisms to reflect beams to the top</li> <li>• AR-coated glass lid</li> <li>• Beam collimation &amp; combination outside of module</li> </ul>

# VEGALAS™ RGB

## Prepared for various Power Classes

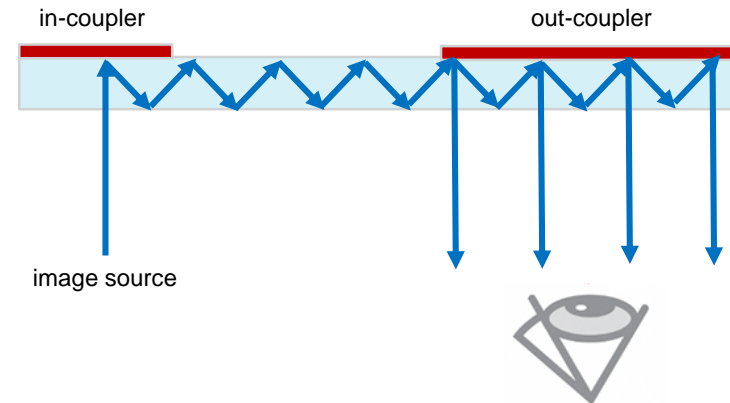
Required laser optical power depends on optical display architecture

### Non-Pupil Forming / Virtual Retina Scanning HOE Reflector Combiner



Laser power 1-5mW per color

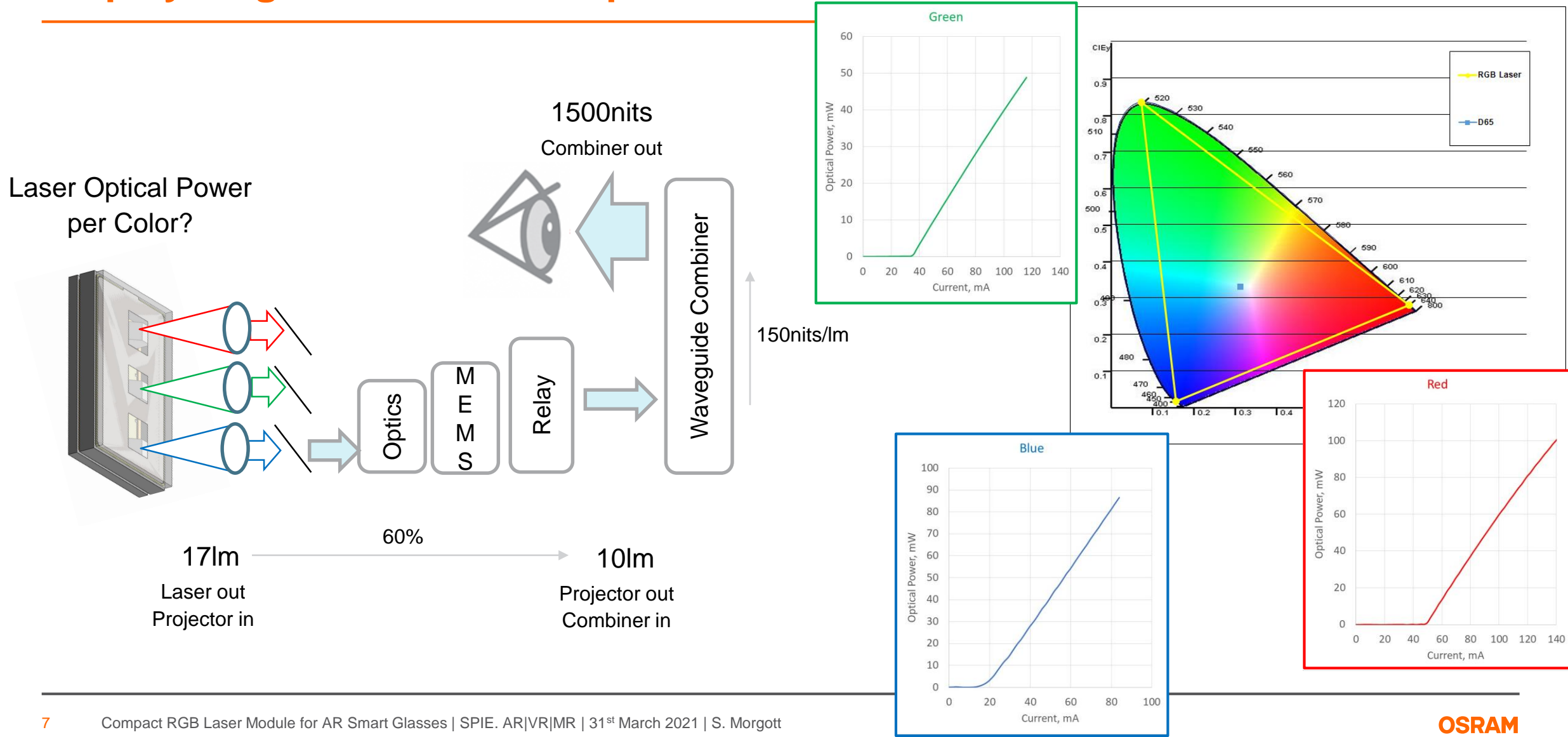
### Pupil Forming (intermediary image) Waveguide Combiner with EPE



Laser power 10-100mW per color

# VEGALAS™ RGB

## Display Brightness – Laser Optical Power



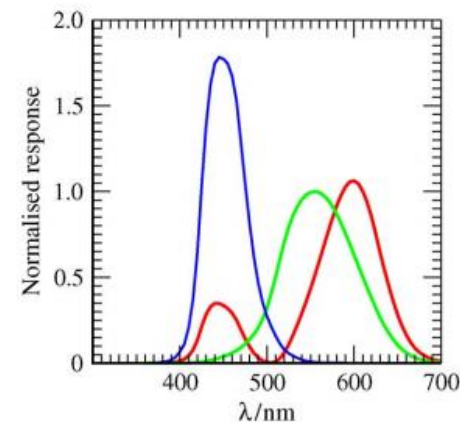
# VEGALAS™ RGB

## Display Brightness – Laser Optical Power

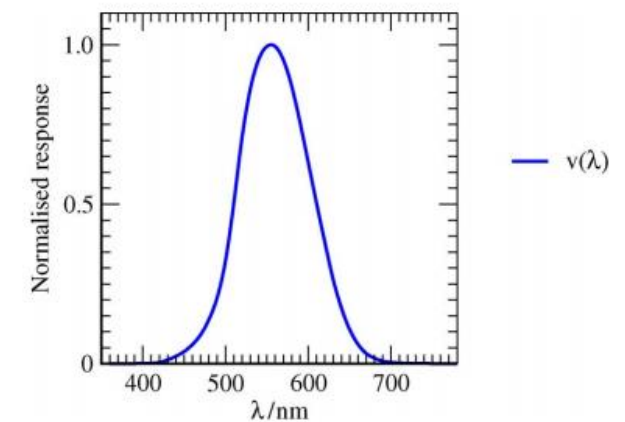
The optical power per color is defined by

- RGB laser primaries
- Target Whitepoint
- Luminous White Flux @ Target Whitepoint

	Red	Green	Blue
Laser Wavelength (Laser Primaries)	640nm	520nm	450nm
Target Whitepoint	D65		
Optical Power Ratio	50%	32%	18%
Luminous Flux Ratio	27%	71%	2%
Example: Optical Power for 17lm	39mW	25mW	14mW
	total 78mW		



CIE Standard Observer  
Color Matching Functions



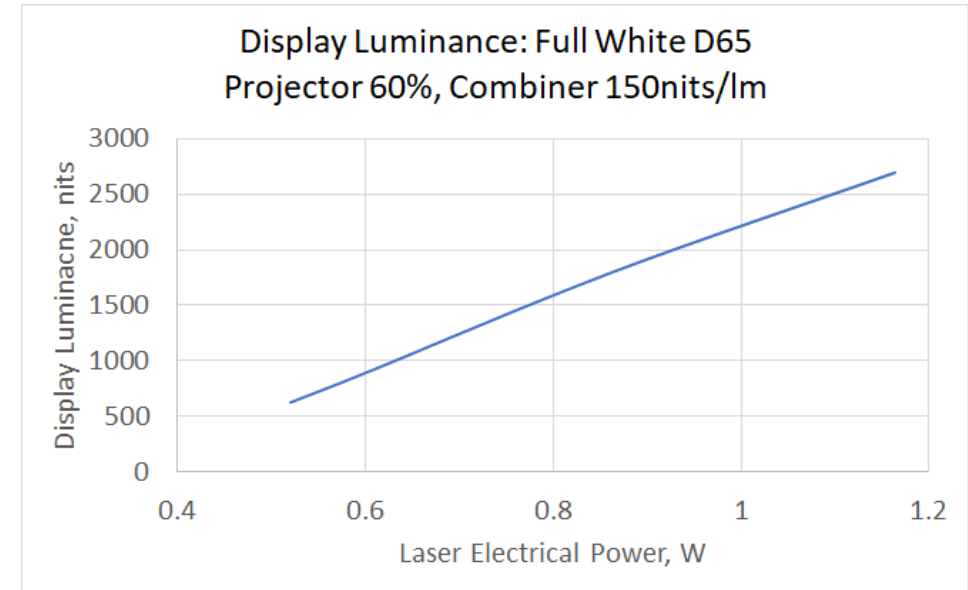
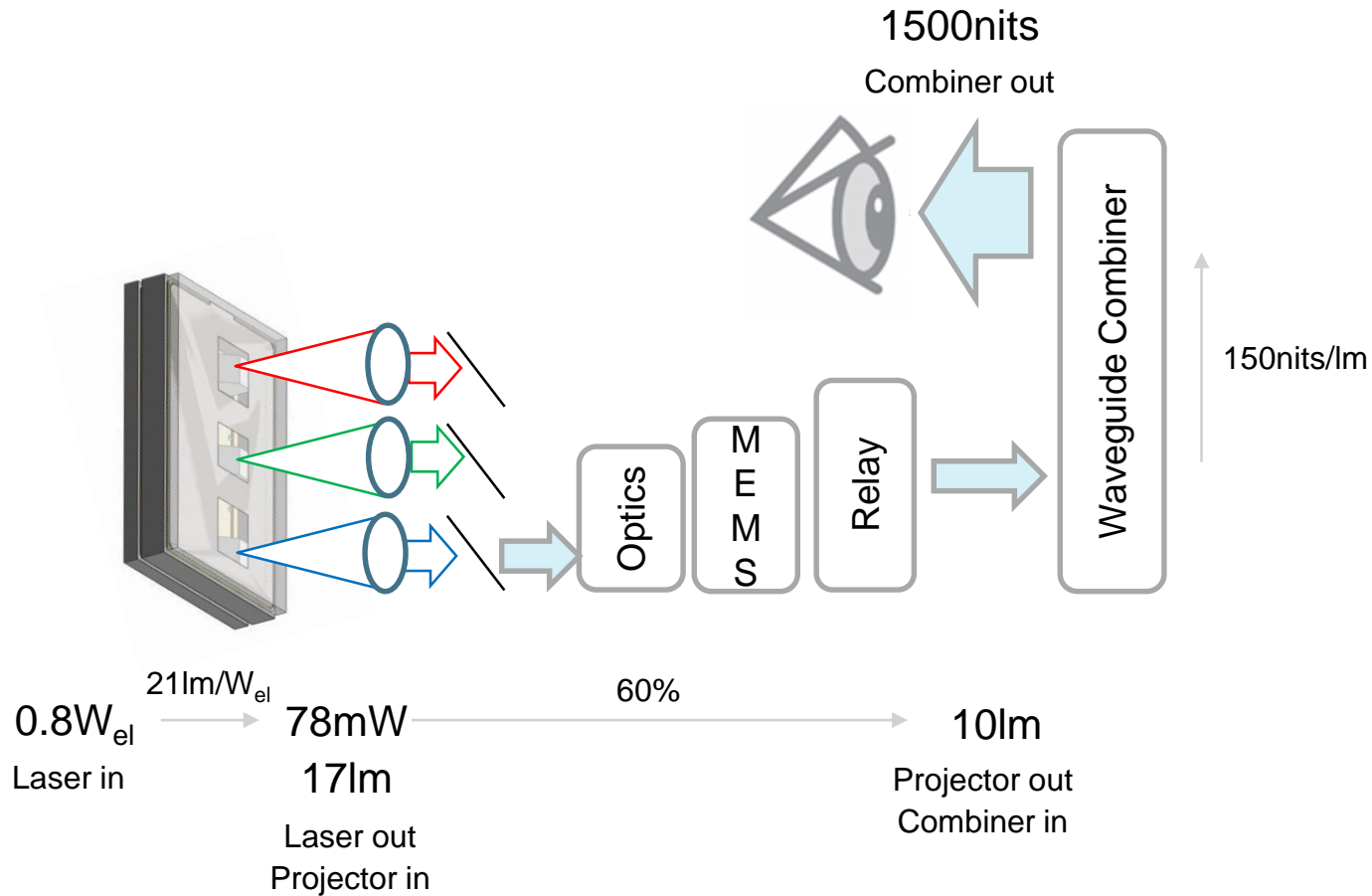
Luminous Efficacy Curve

E. Buckley, Laser Wavelength Choices for Pico-Projector Applications,  
Journal of Display Technology, Vol. 7, No. 7, July 2011



# VEGALAS™ RGB

## Display Brightness – Laser Optical Power



# VEGALAS™ RGB

## Schedule

- **Current Status**
  - Design Verification Phase
  - Samples Available
  - Participation in LaSAR Alliance
  
- **SOP planned for mid 22**



<https://newsroom.st.com/media-center/press-item.html/t4297.html>

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Thank you!