

# One-shot Hyperspectral Imaging using Faced Reflectors

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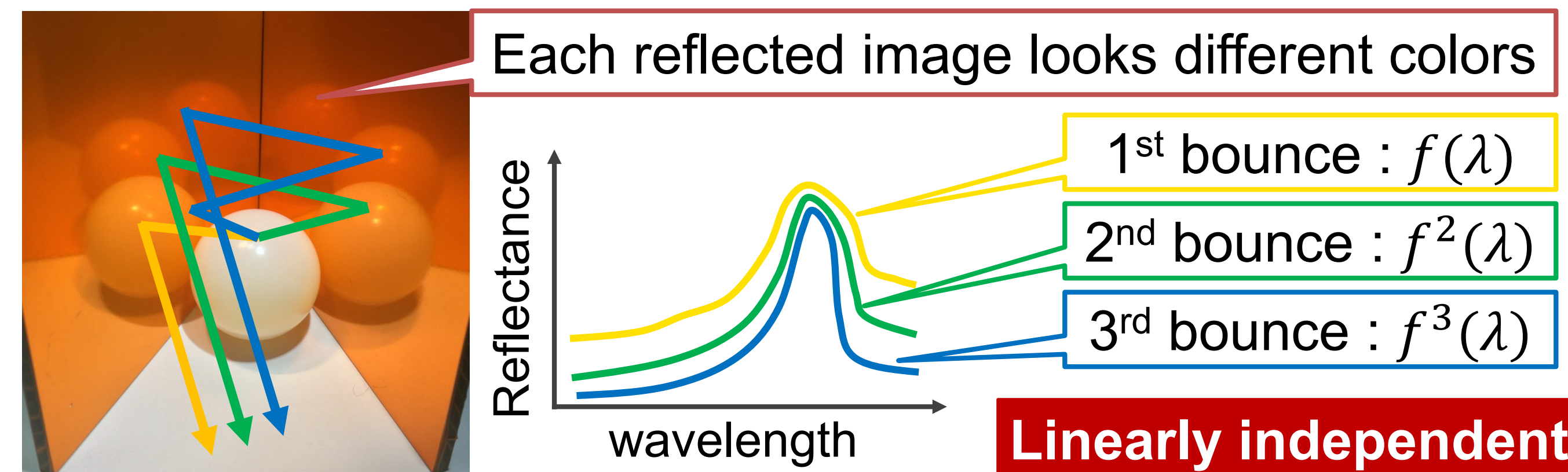


## Goal of this work

- A novel hyperspectral imaging technique characterized by
- **Easy implementation** with readily available stuff
  - **One-shot** measurement

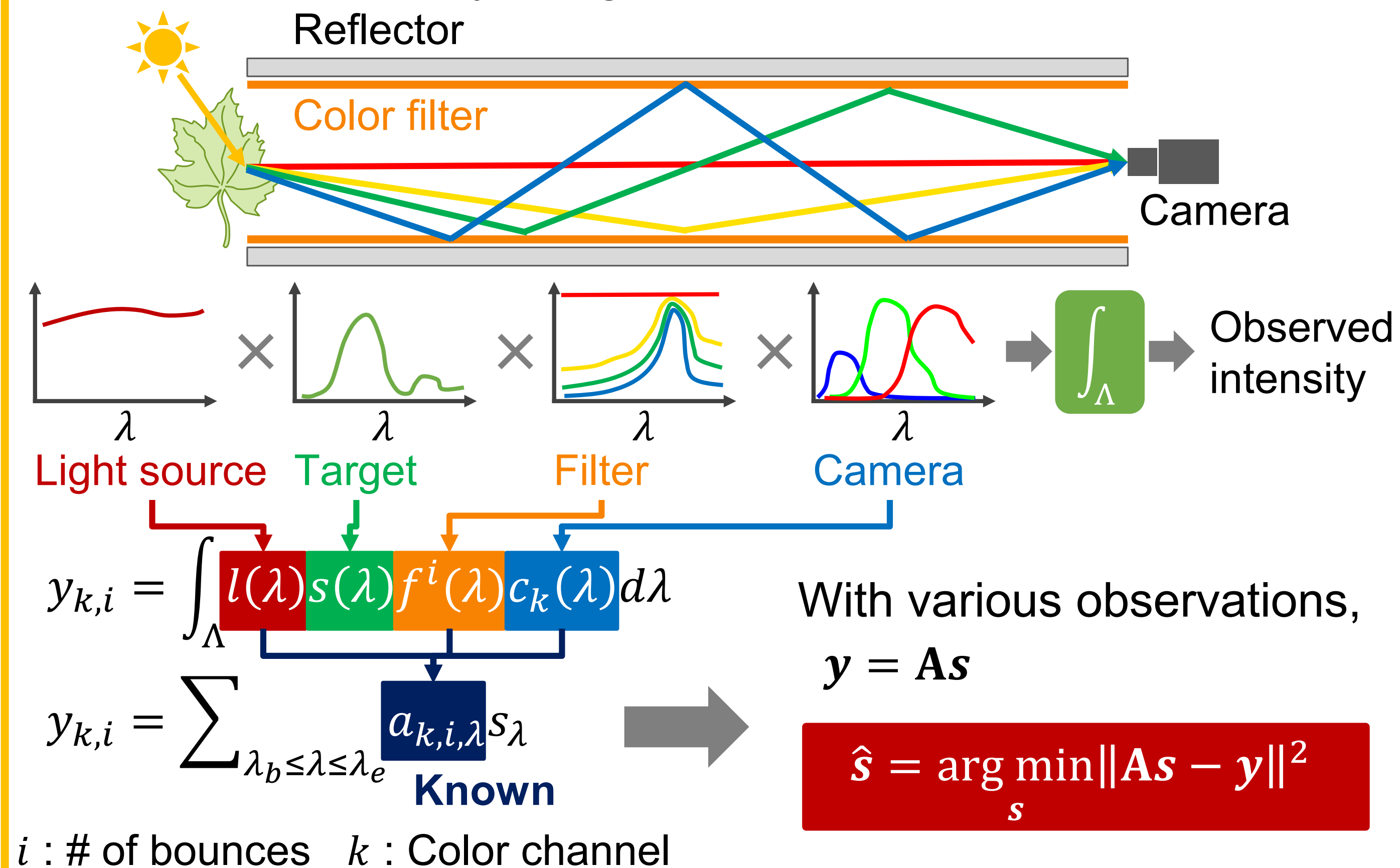
## Key idea

**Multiple reflections make virtually different color filters**



## Appearance model

Multiple reflections by using **faced reflectors**



## Implementations

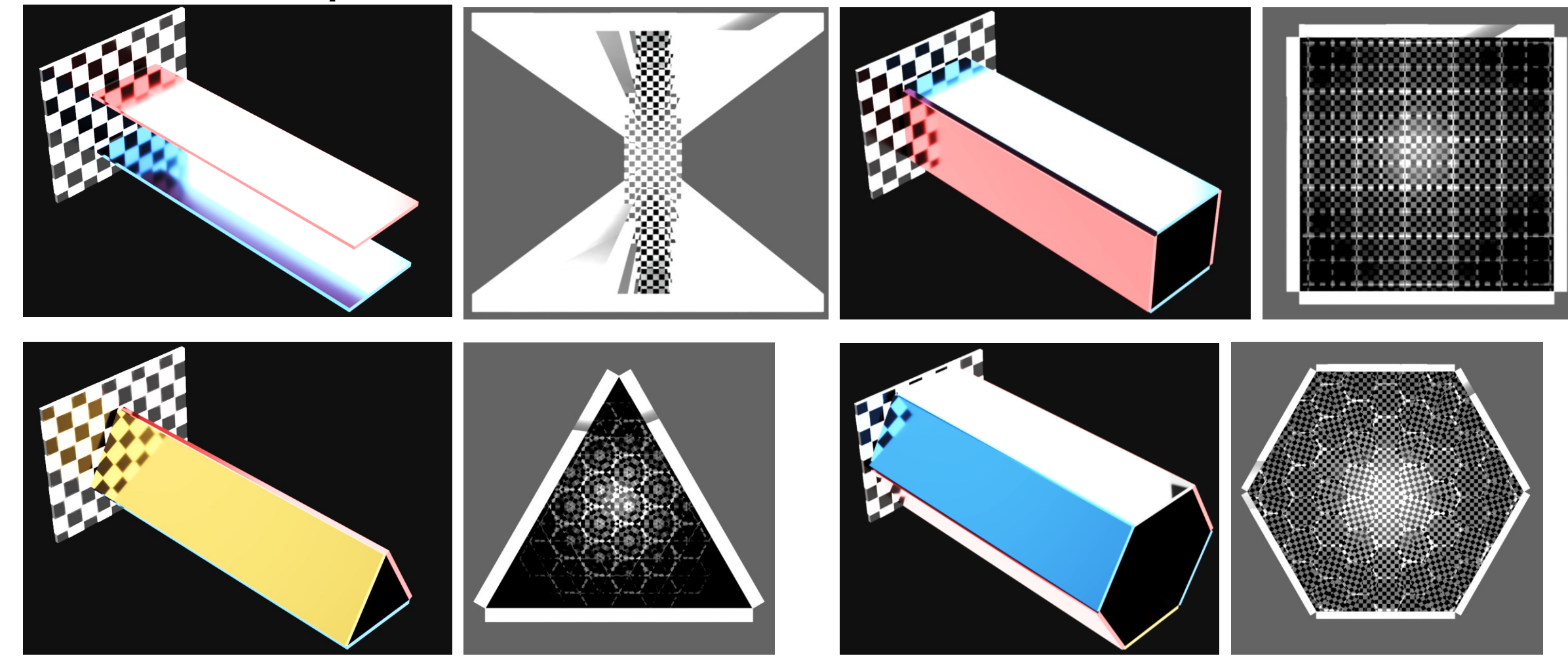
- **How to select the color filter?**

Filter selection based on the condition number

**Lower condition number → More stable computation**

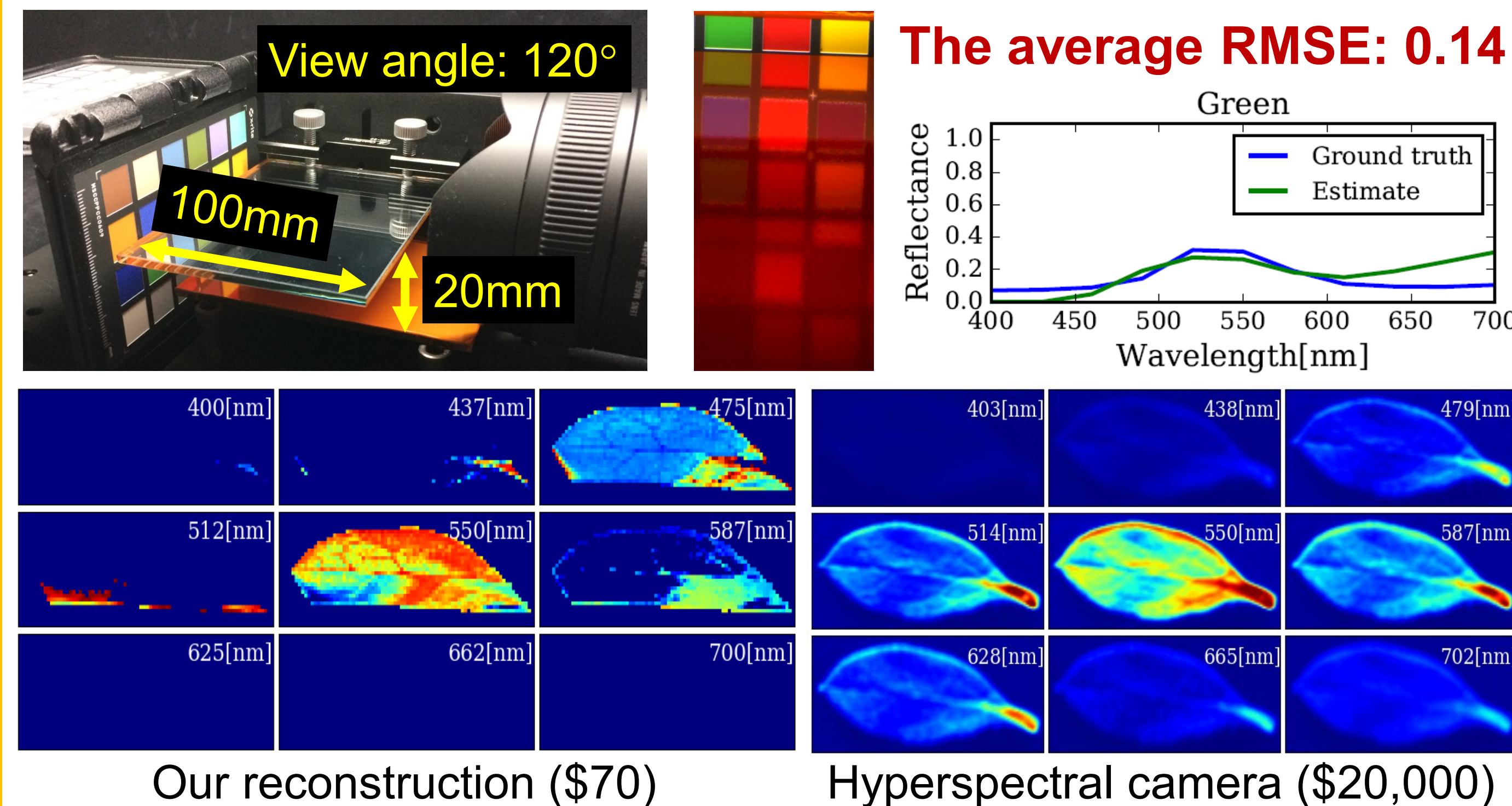
- **What kind of reflector geometries?**

Several setups based on faced reflectors



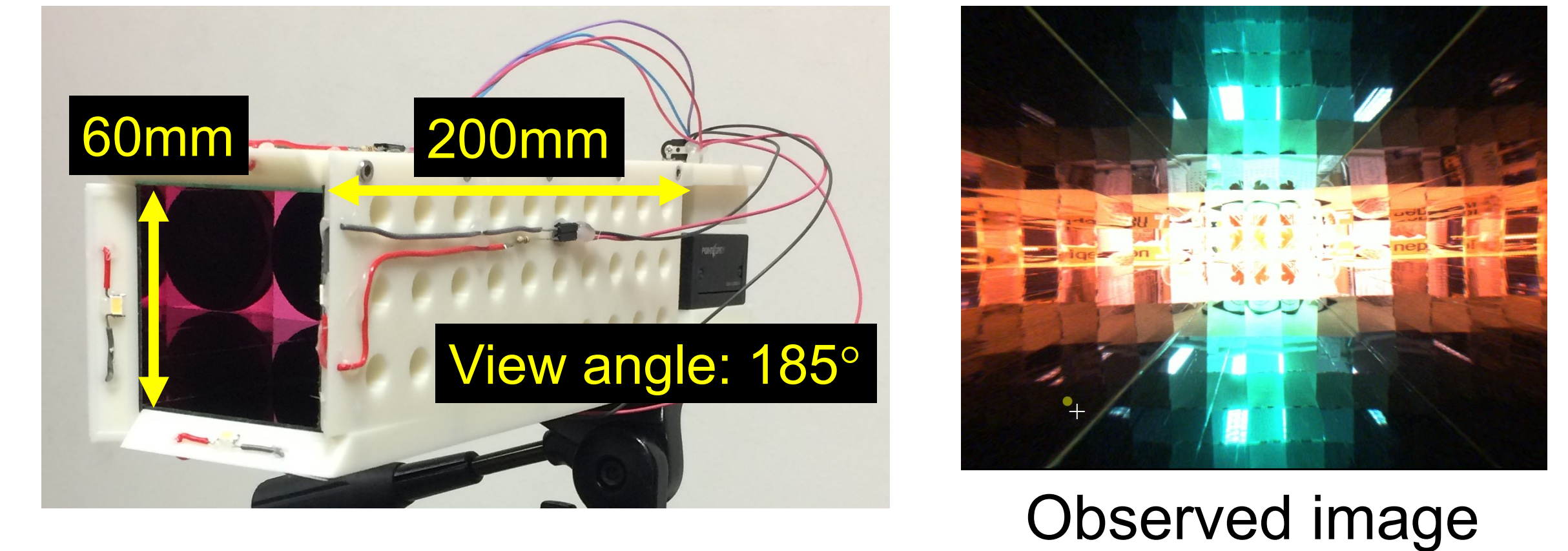
## Prototype#1: Coupled mirror geometry

Orange thin filter (\$10) + Front surface mirrors (\$60)



## Prototype#2: Rectangular kaleidoscope geometry

Two different color films (\$20) + Front surface mirrors (\$120)

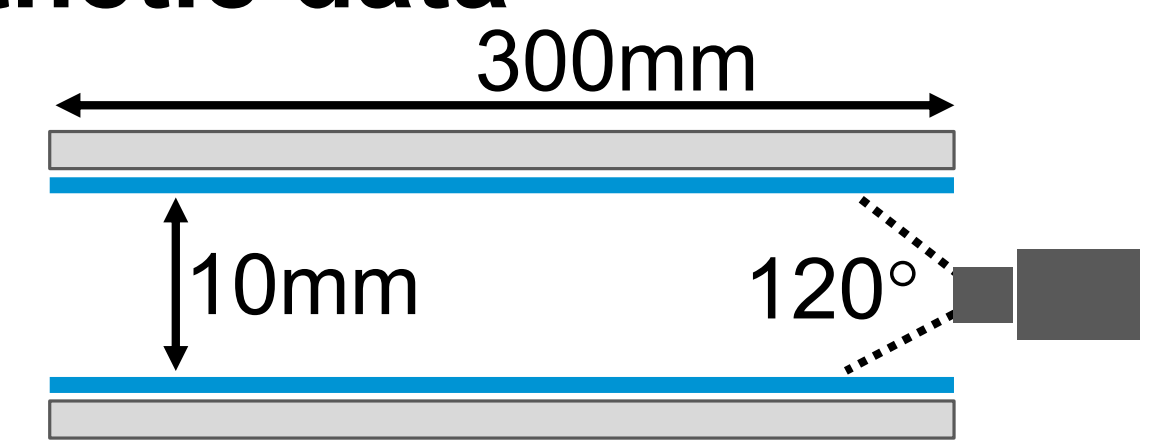


Extension work for next step

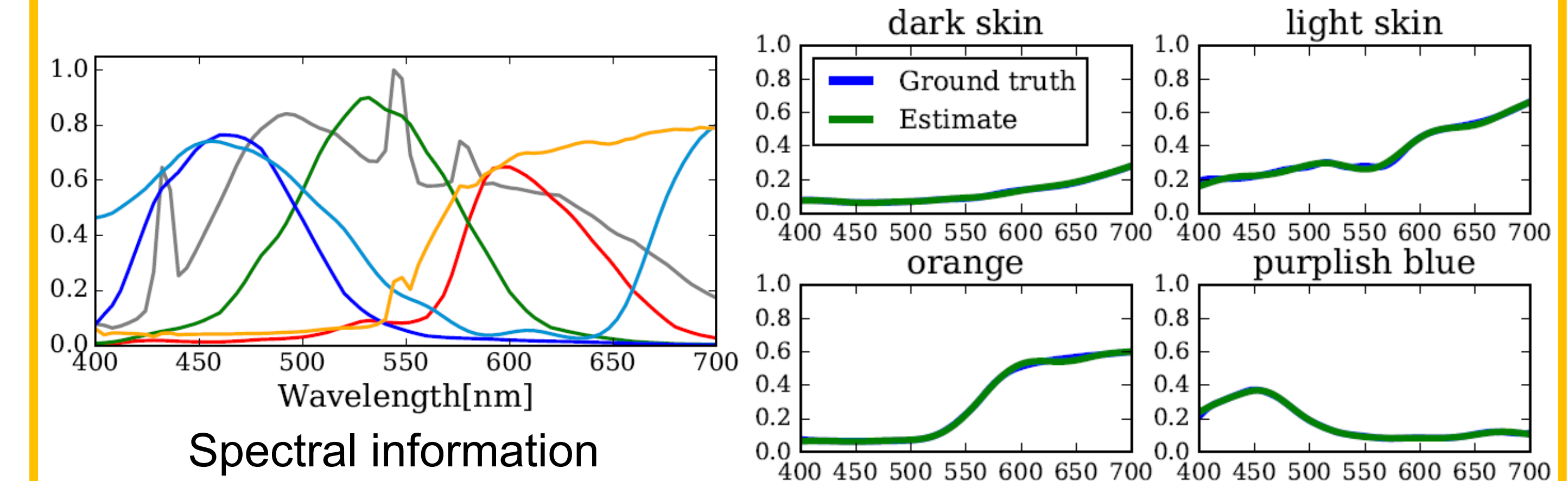
## Quantitative evaluation on synthetic data

Setup

- Roscolux #67 Light Sky Blue
- Gaussian noise 0.1%
- Nikon D5100
- Light source D65



The average RMSE: 0.01



## Trade-off & limitations

- Spatial – spectral resolutions trade-off
- Low SNR after a number of reflections
- Flat-surface objects only