# Identificación de Pigmentos de Efecto

***Universidad de Alicante, 5 de julio de 2006***

Dpto. Interuniversitario de Óptica

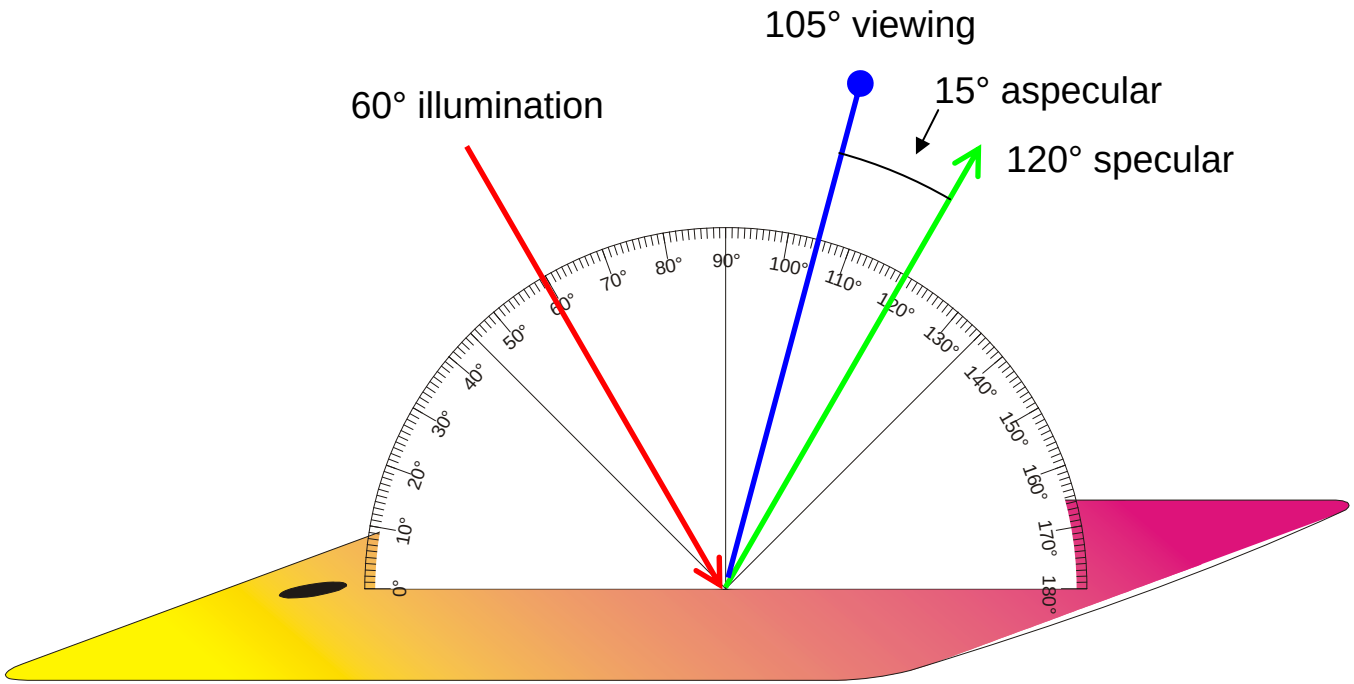
Werner Rudolf Cramer

info@wrcramer.de

# Geometries

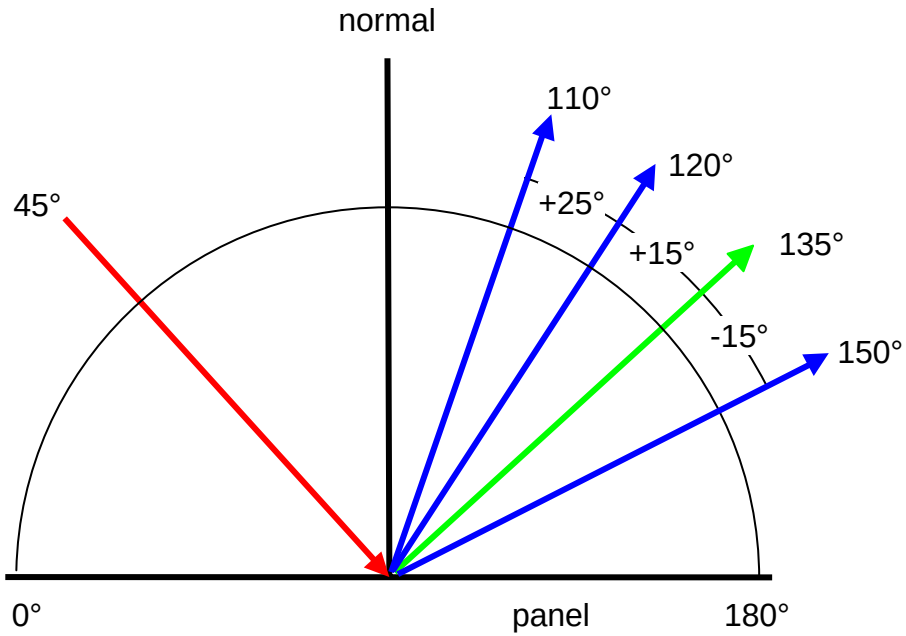
- To understand the color reaction of interference pigments, you have to understand the geometries of illumination and observation.
- You start on the surface of your test panel. This is the base for a semicircle drawn from 0° to 180°.
- You combine this semicircle with optical laws, in particular:
  angle of incident = angle of reflection

# Semicircle




To understand the color reaction of interference pigments, you have to understand the geometries.

# Geometries




Panel 0° - 180°,

90° normal (0° optical),

45° illumination,

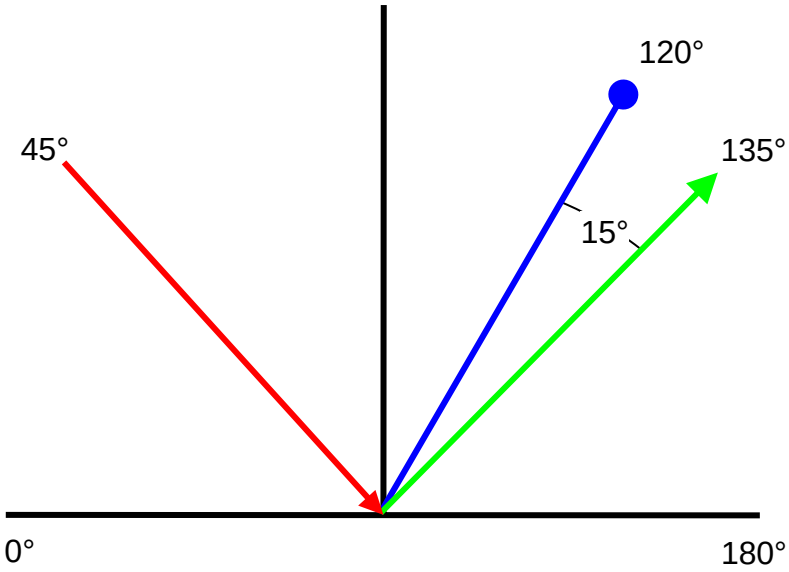
135° specular,

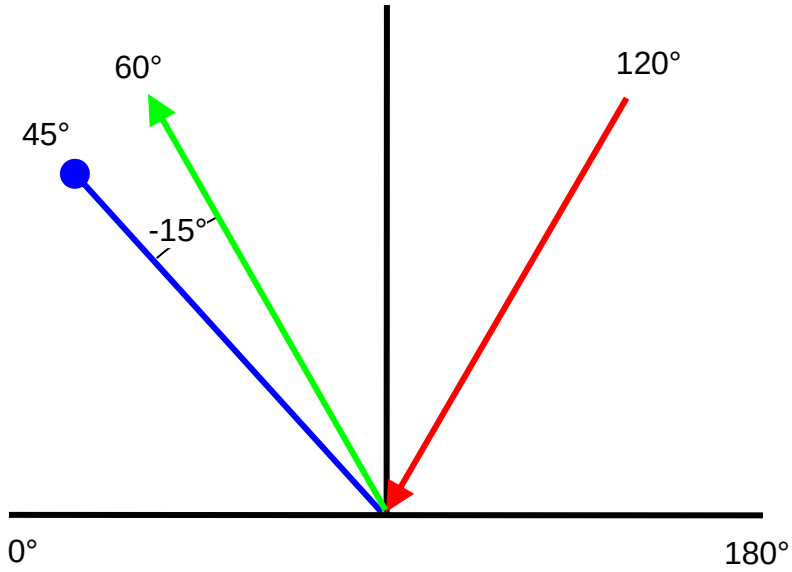
120° = 15° aspecular
= 15° *cis*,

150° = -15° aspecular
= 15° *trans*,

110° = 25° aspecular
= 25° *cis*.

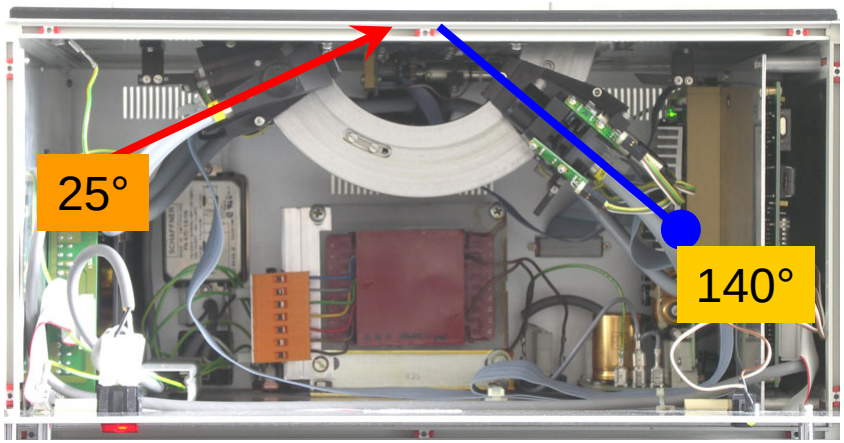
# Geometries

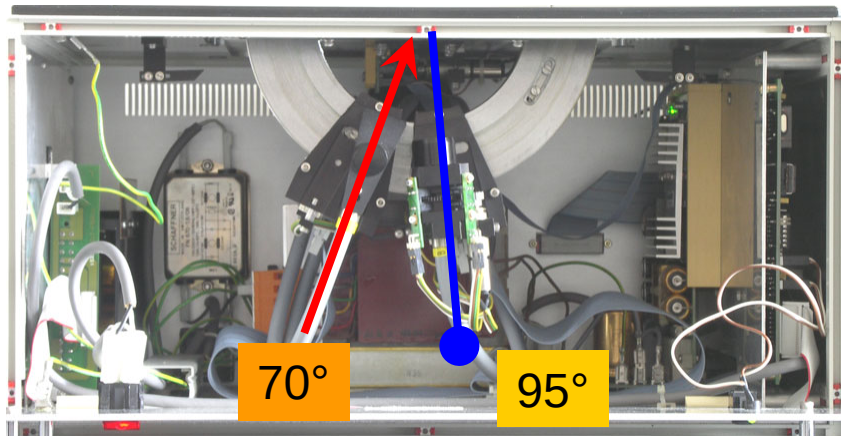


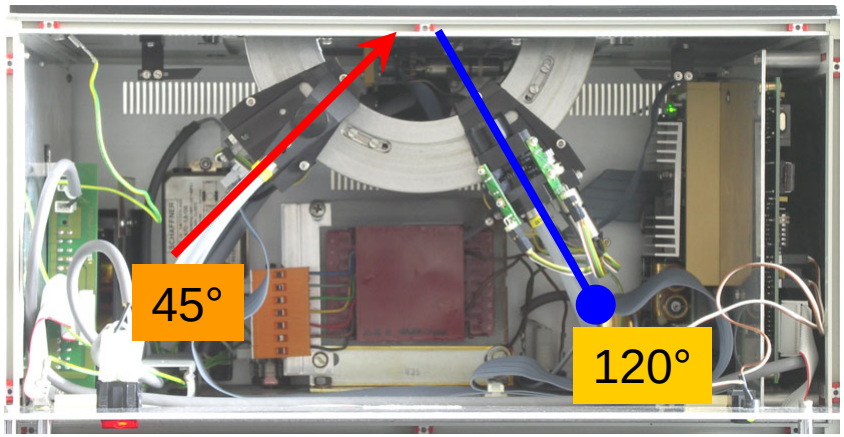




In case of interference pigments, you can exchange the geometries.

# Instruments



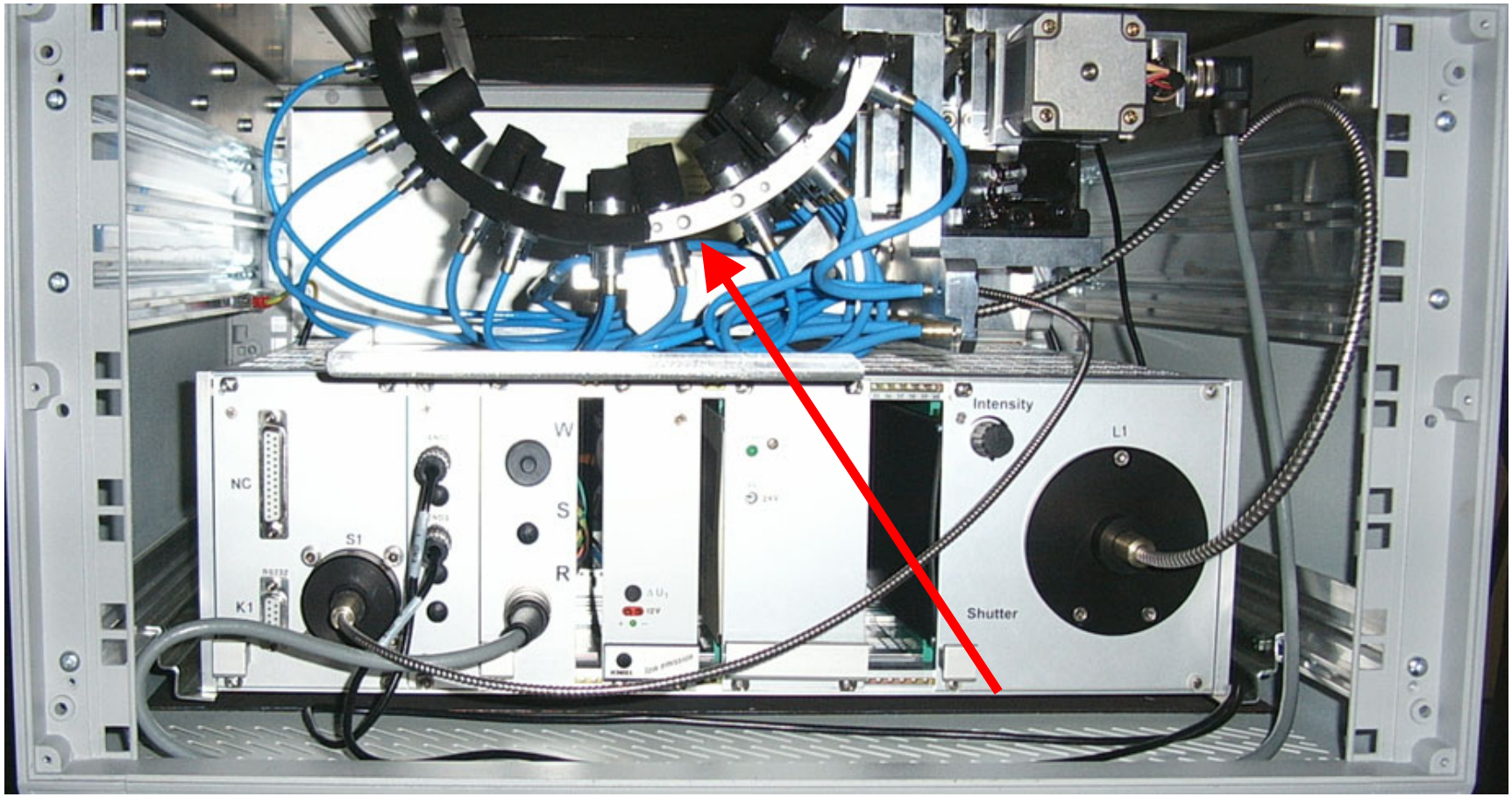




Zeiss GK 311/M:

independent illumination and measuring.

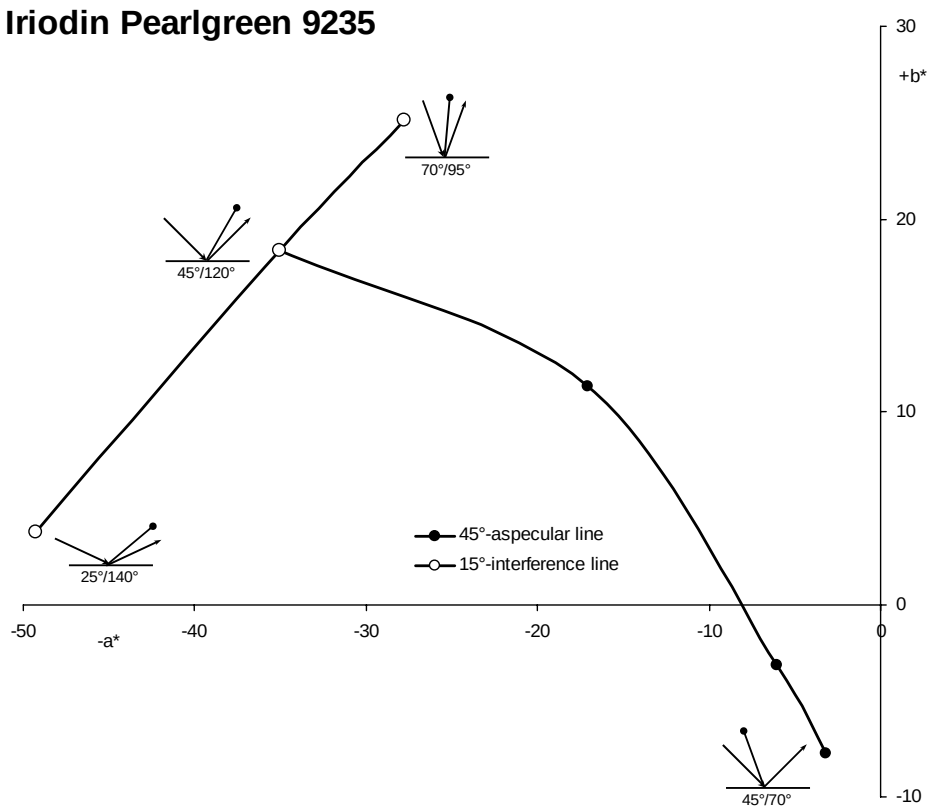
# Instruments




Datacolor MultiFX10:

Rack with illuminators and observers

# Typical image

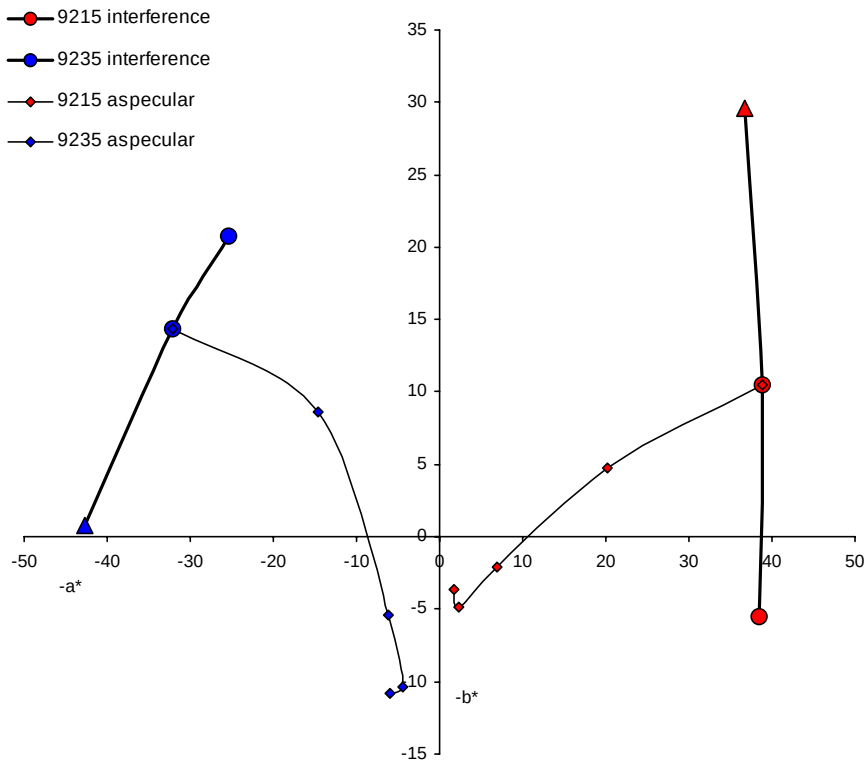


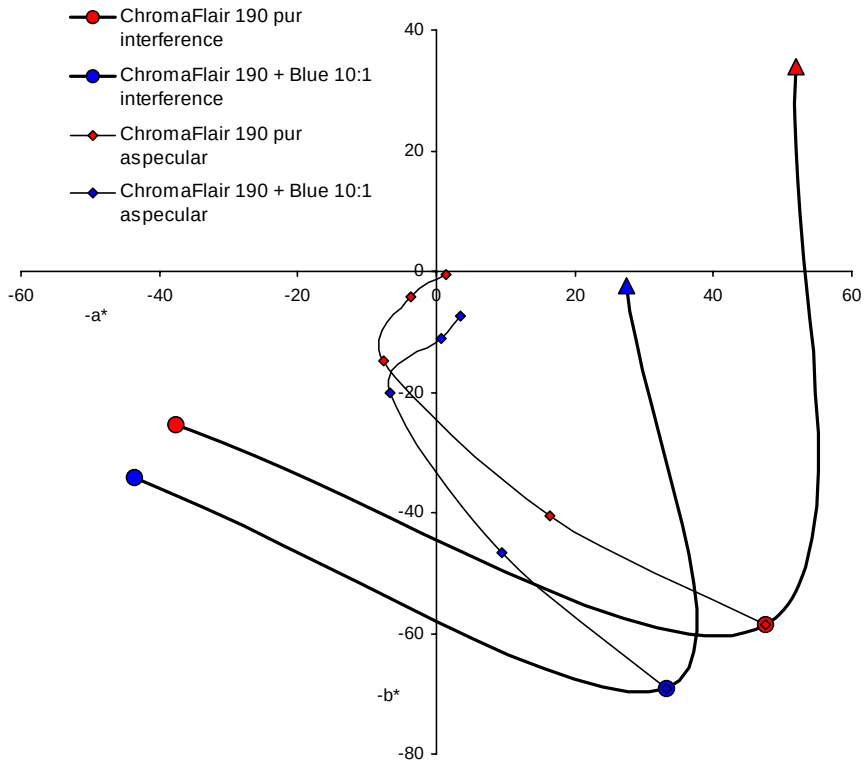

Typical description of an interference pigment:

Interference line 25°/140° - 45°/120° - 70°95°

Aspecular line 45°/120°, 45°/110°, 45°/90°, 45°/60°, 45°/25°

# Easy to characterize



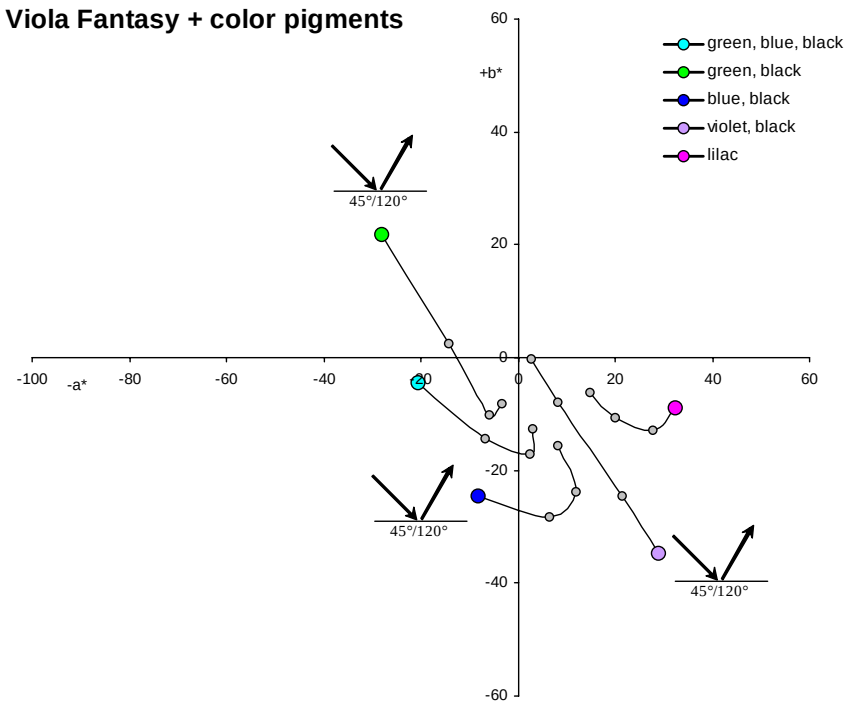



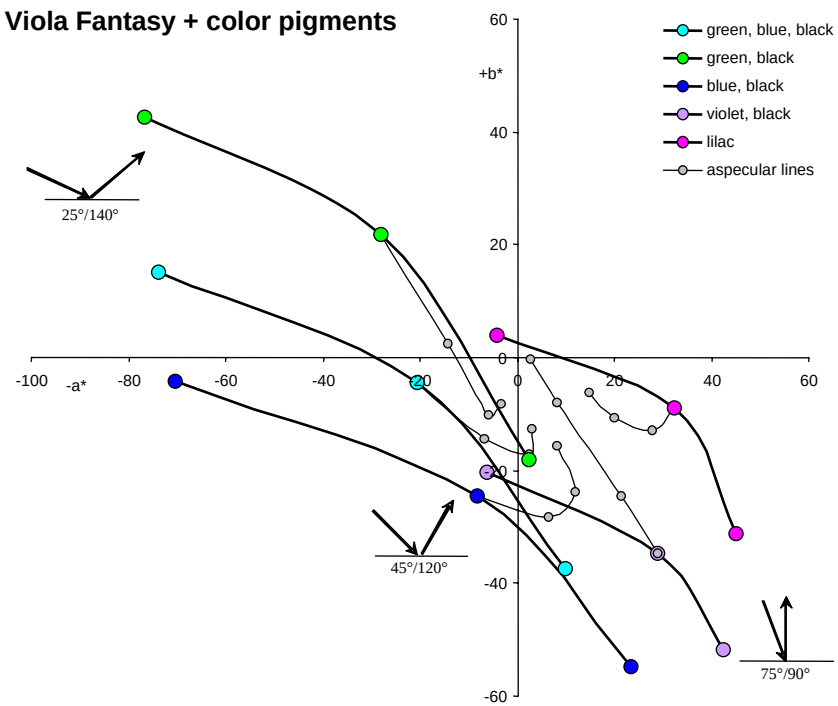

Examples of different interference pigments:

Left chart: Pearlgreen and Pearlred

Right chart: Viola Fantasy, standalone and mixture

# More information

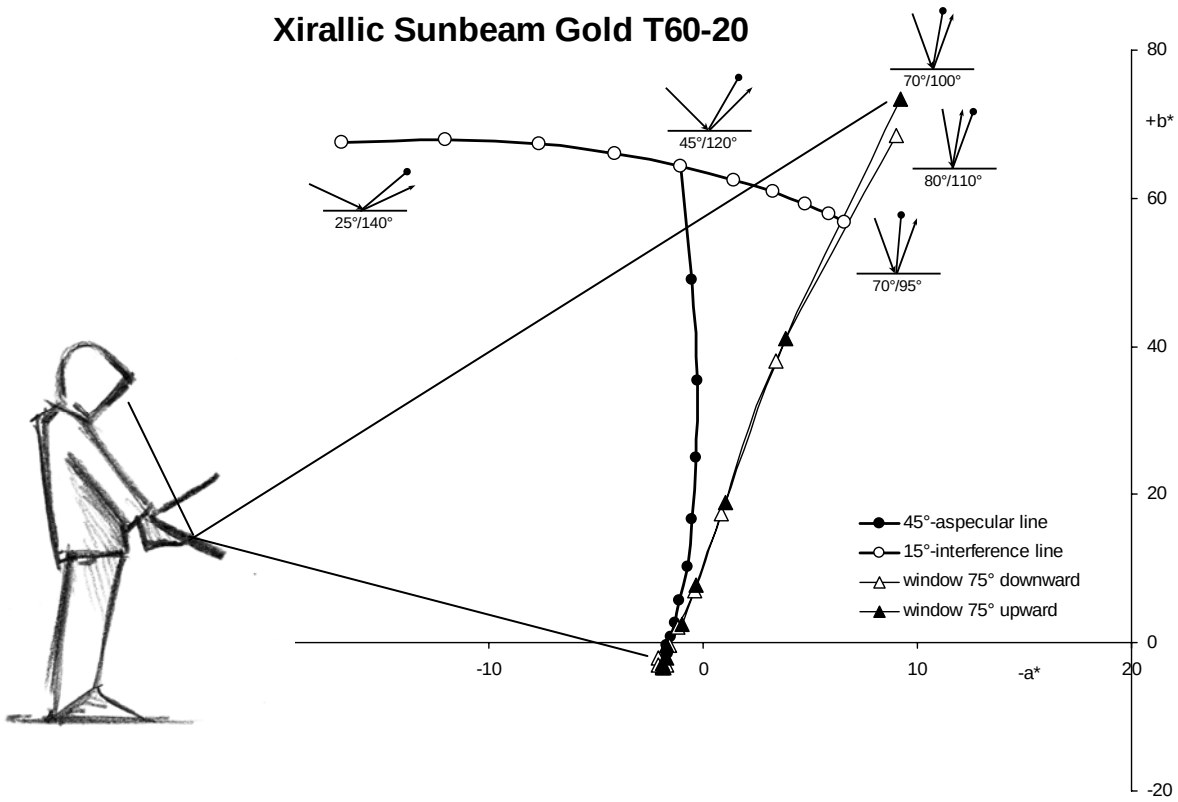



Left chart: aspecular geometries

Right chart: Additional interference geometries

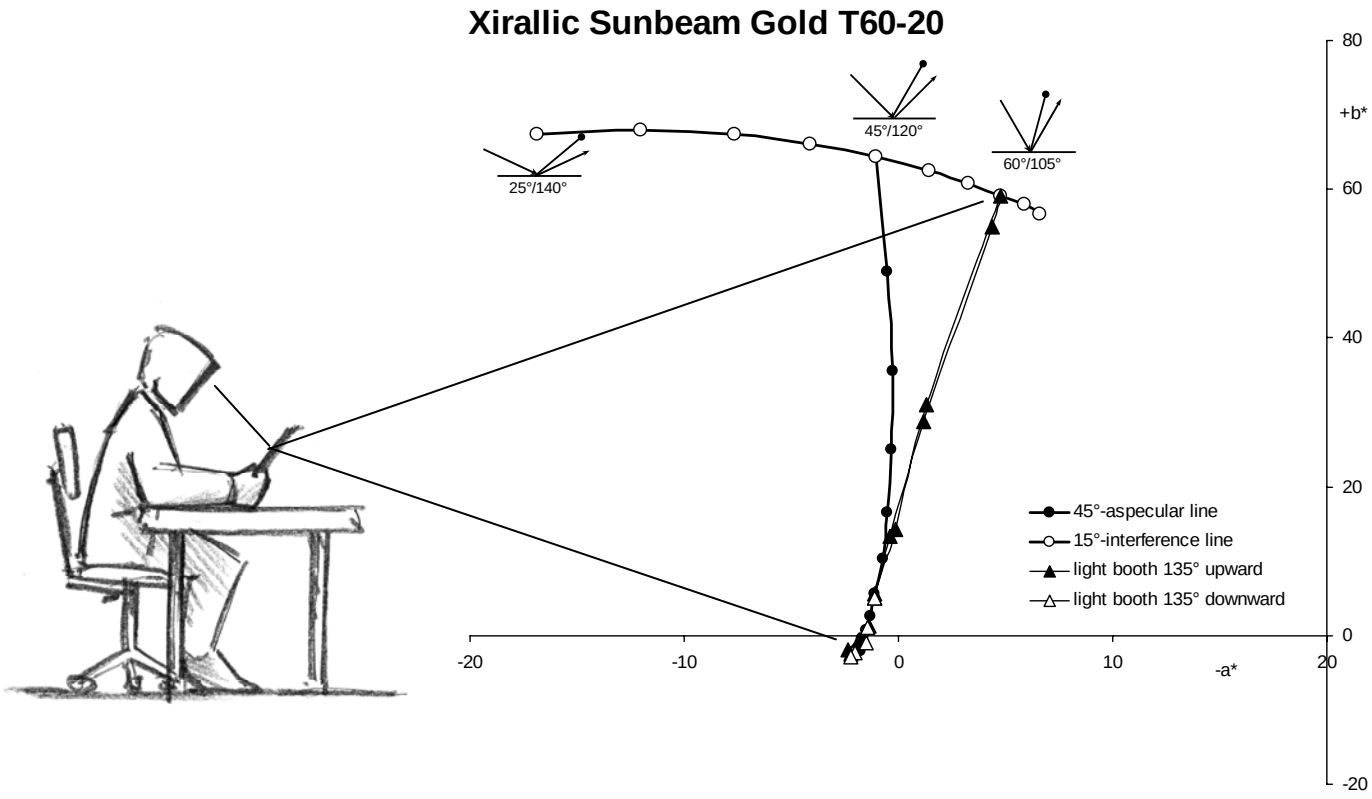
# Visual assessment: window




Conventional assessment of panel at a window:

Tipping panel up and down, color information is very poor.

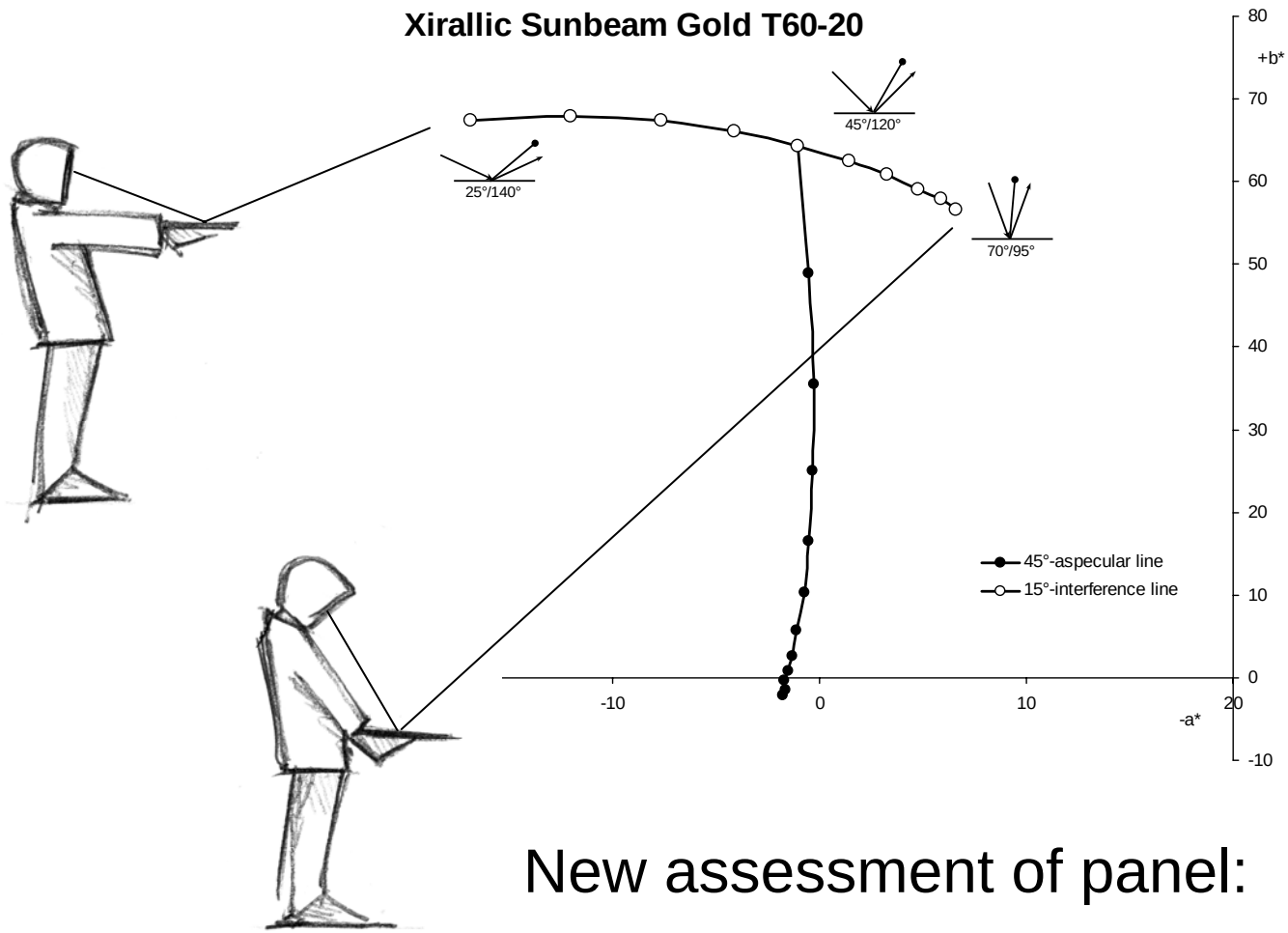
# Visual assessment: Light booth




Conventional assessment of panel in a light booth:

Tipping panel up and down, color information is very poor.

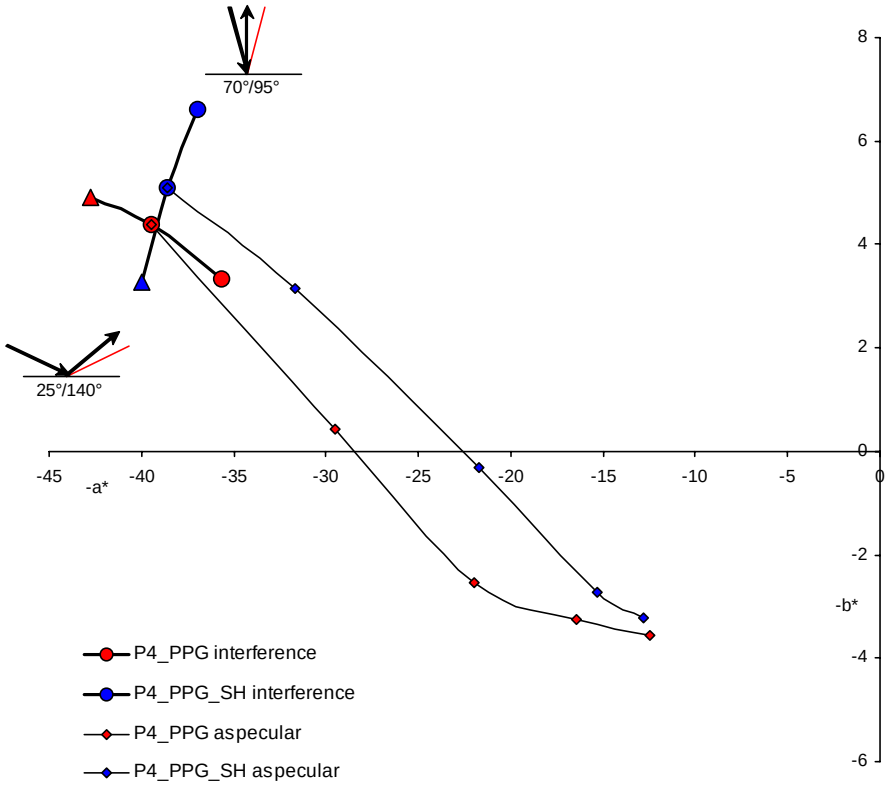
# New assessment

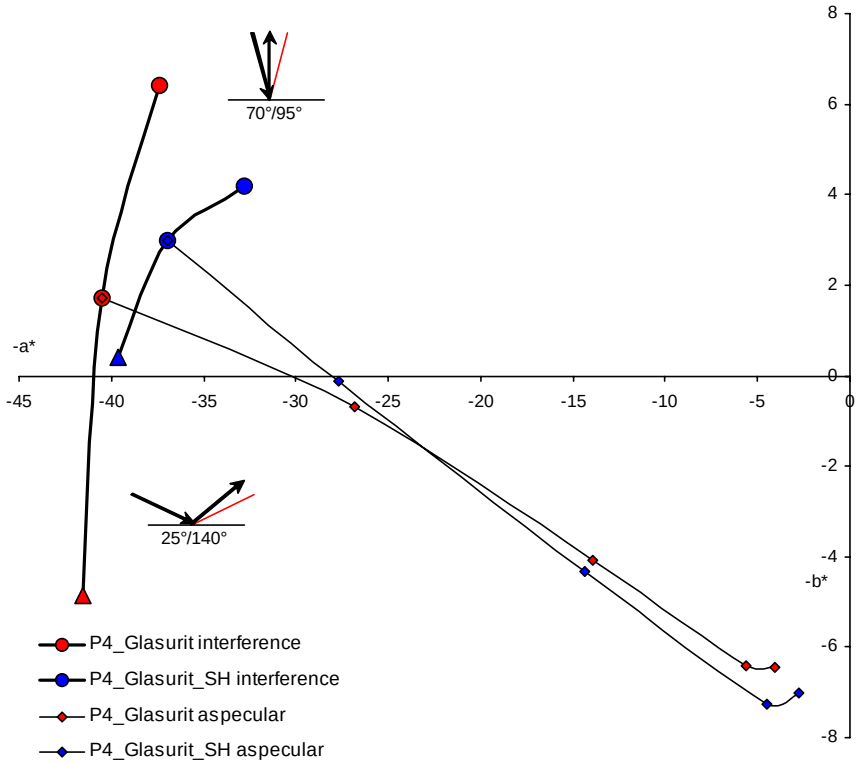



New assessment of panel:

Moving panel parallel up and down.

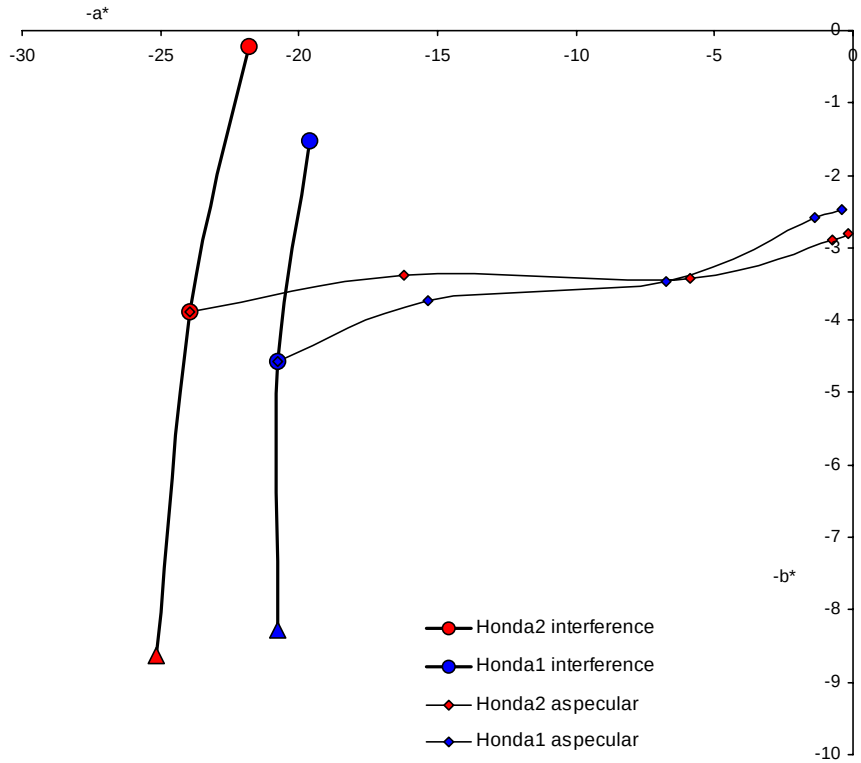
# Measurement & identification

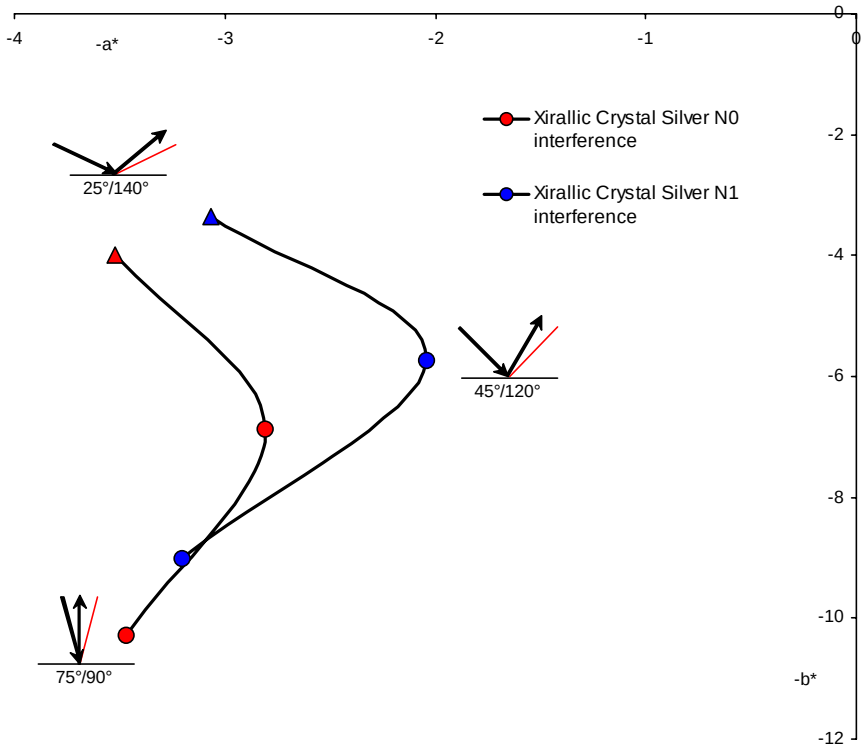



Same color, different results:
measuring at aspecular geometries holds the risk of unacceptable results.

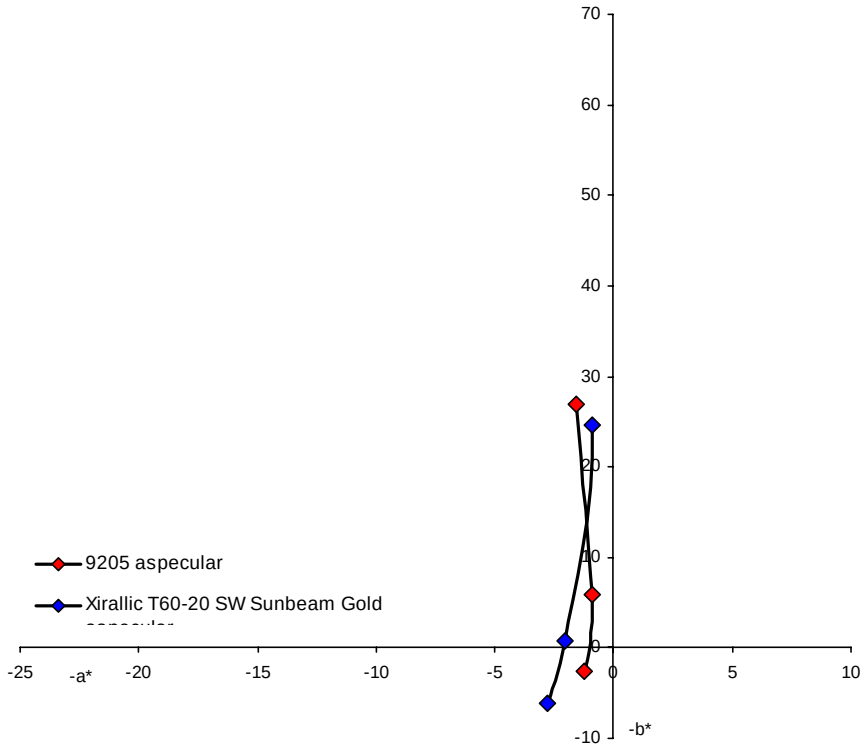
# Measurement & identification

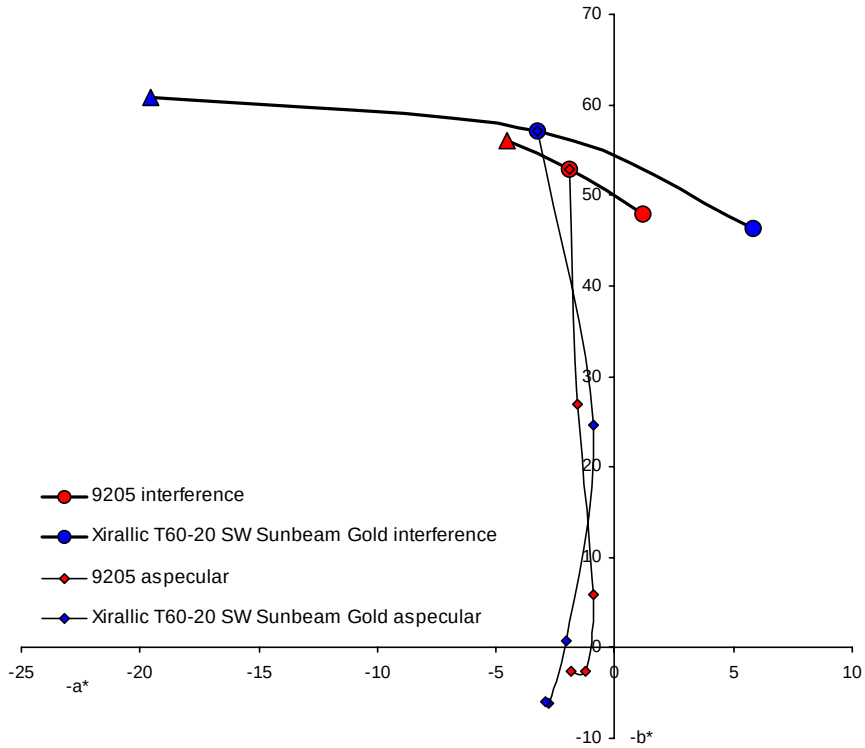



Same color, different methods of application
Left chart: Honda Pearl
Right chart: Xirallic Crystal Silver

# Measurement & identification

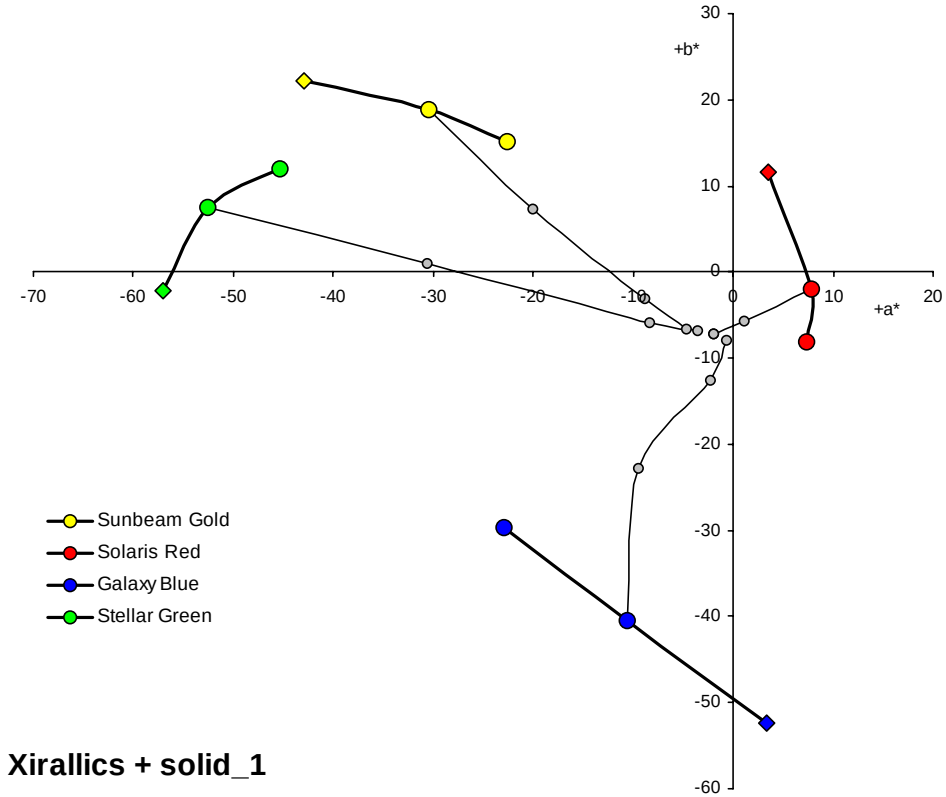



Mostly used are the aspecular geometries at 25°, 45° and 75° or 110° aspecular.

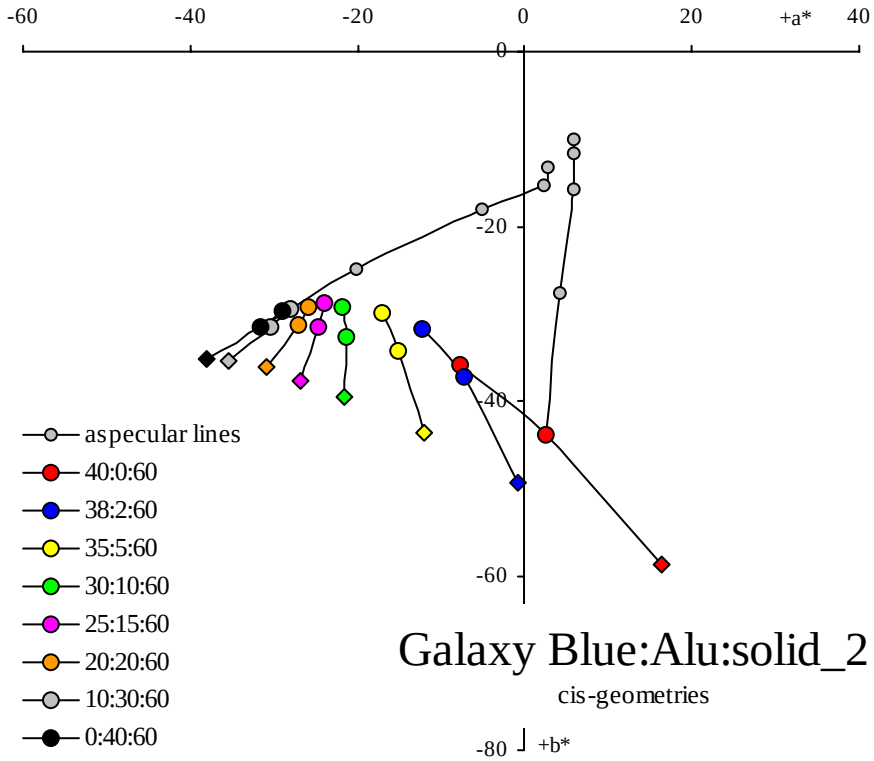
Indeed, you do not „see“ the two different yellow pigments.

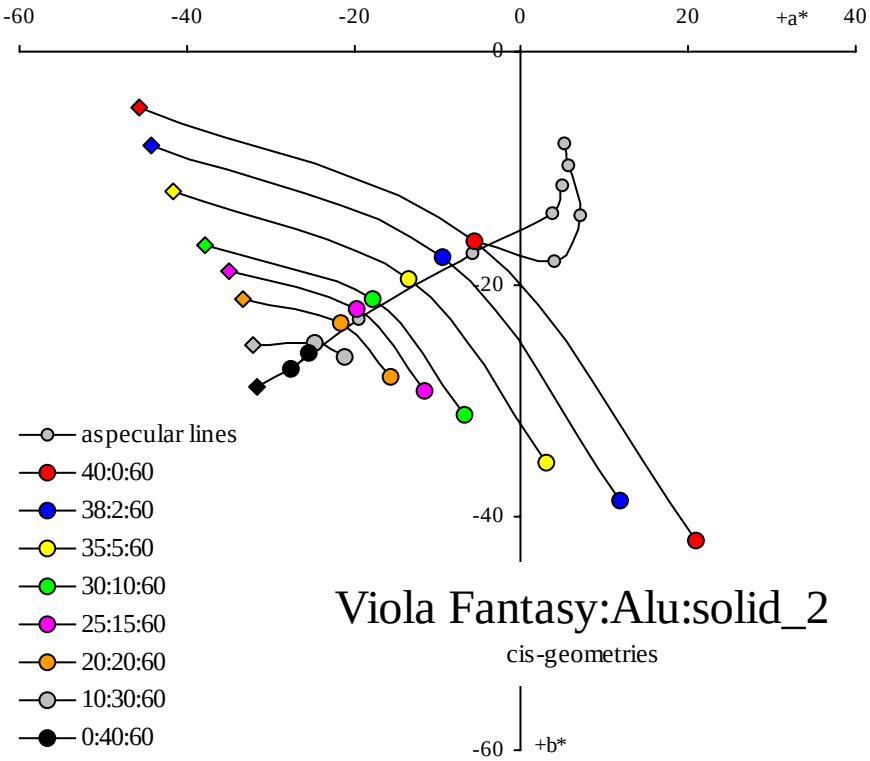
# Measurement & identification




Two additional geometries help to identify interference pigments. Each interference pigment has its own characteristic.

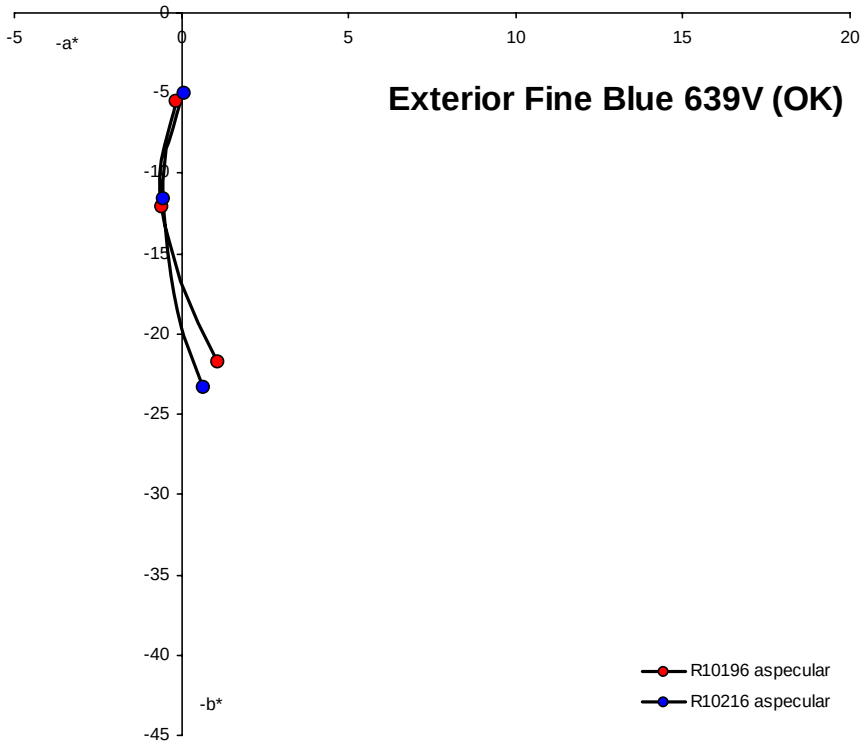
# Measurement & identification

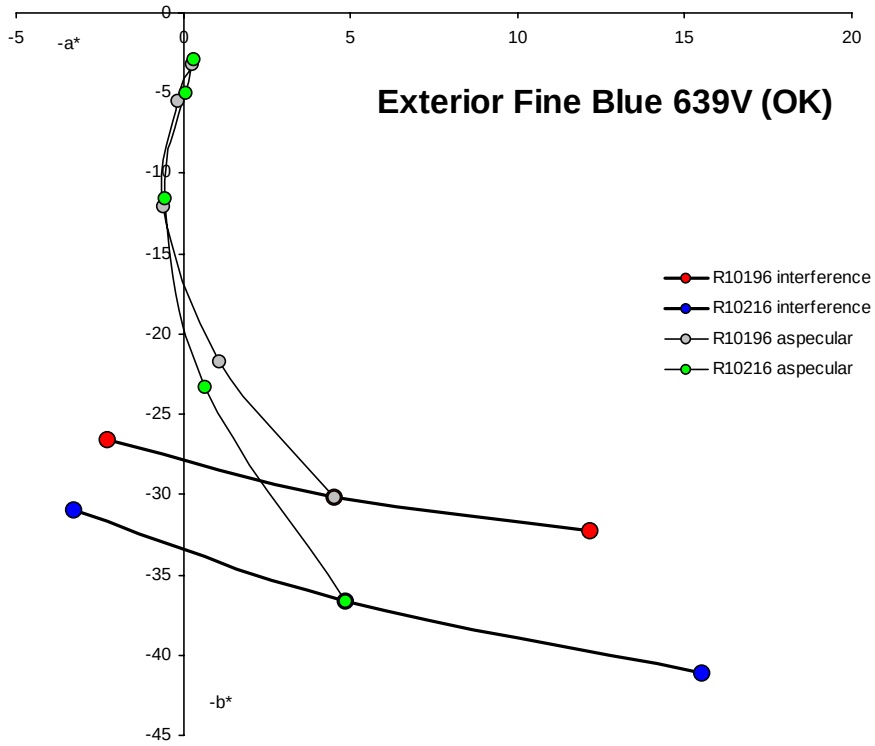



You can distinguish mixtures with and without interference pigment: Latter show „interference“ and aspecular data in one line.

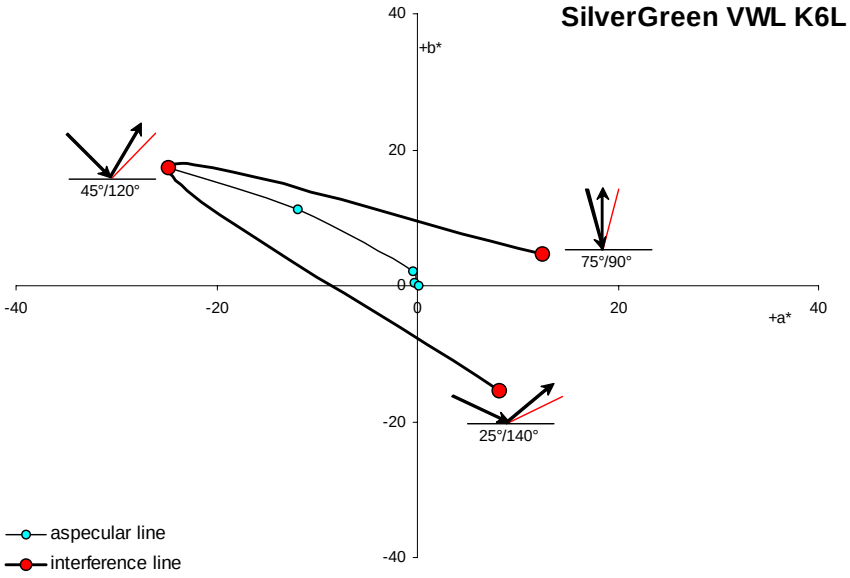
# Measurement & identification

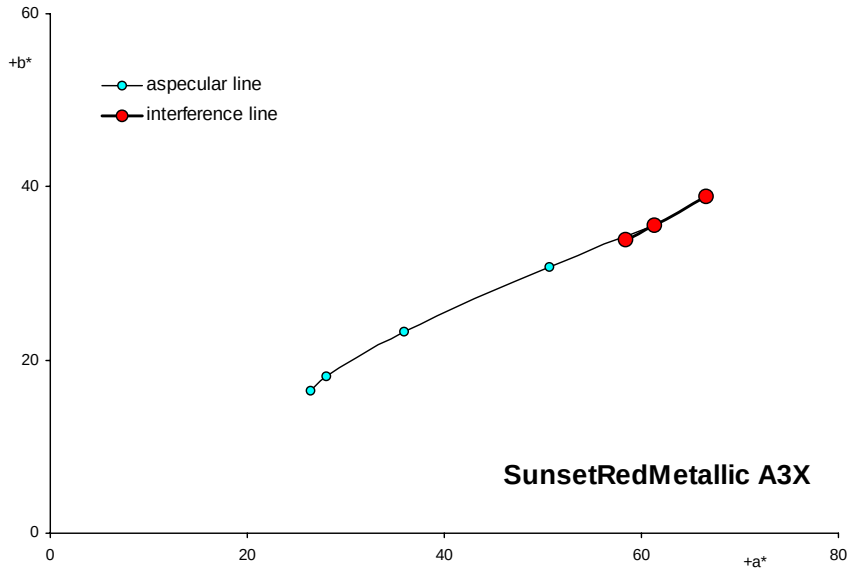



Conventional data (left) show no significant differences. Additional interference data give you a better idea of color differences (right).

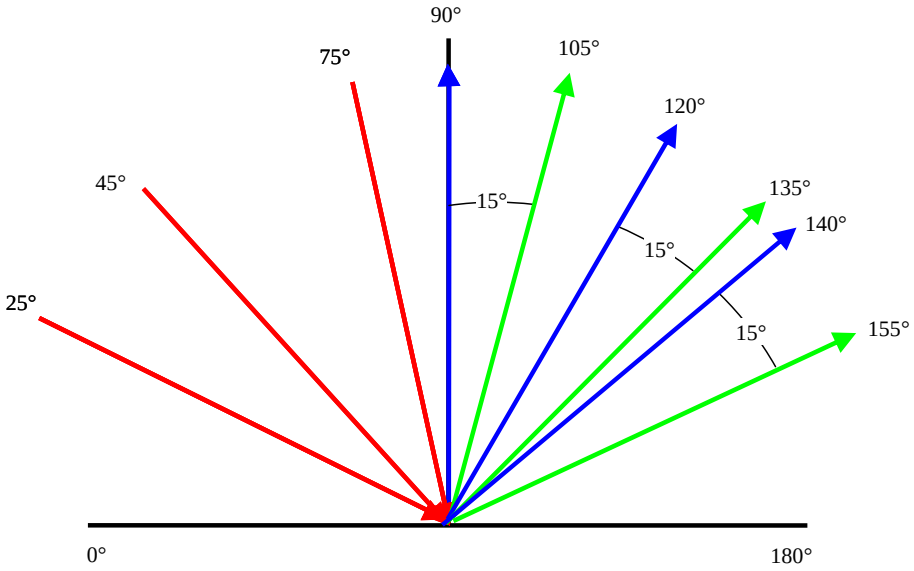
# Measurement & identification

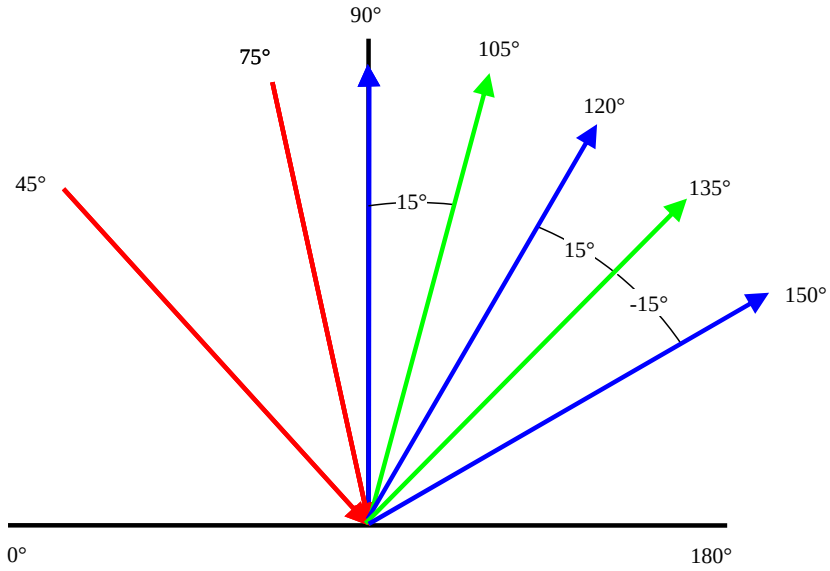



Left chart: ChromaFlair pigment - shifting from orange via green to violet (no aluminium)
Right chart: aluminium pigment shifting up and down the specular line.

# Discussion




| Illumination | Specular | Viewing | aspecular |
|---|---|---|---|
| 75° | 105° | 90° | +15° (cis) |
| 75° | 105° | 120° | -15° (trans) |
| 45° | 135° | 120° | +15° (cis) |
| 45° | 135° | 150° | -15° (trans) |
| 25° | 155° | 140° | +15° (cis) |
| 25° | 155° | 170° | -15° (trans) |

# Conclusion

- For a correct visual and instrumental assessment, you need additional illuminations.
- Ideal angles of illumination are 75° (steep), 45° (classical) and 25° (flat) with constant aspecular angle of 15°.
- To get information about the color system, you need still the conventional geometries at a fixed angle of illumination at 45° and different aspecular angles.

# El fin. Muchas gracias!