Material measurement and modelling

part I

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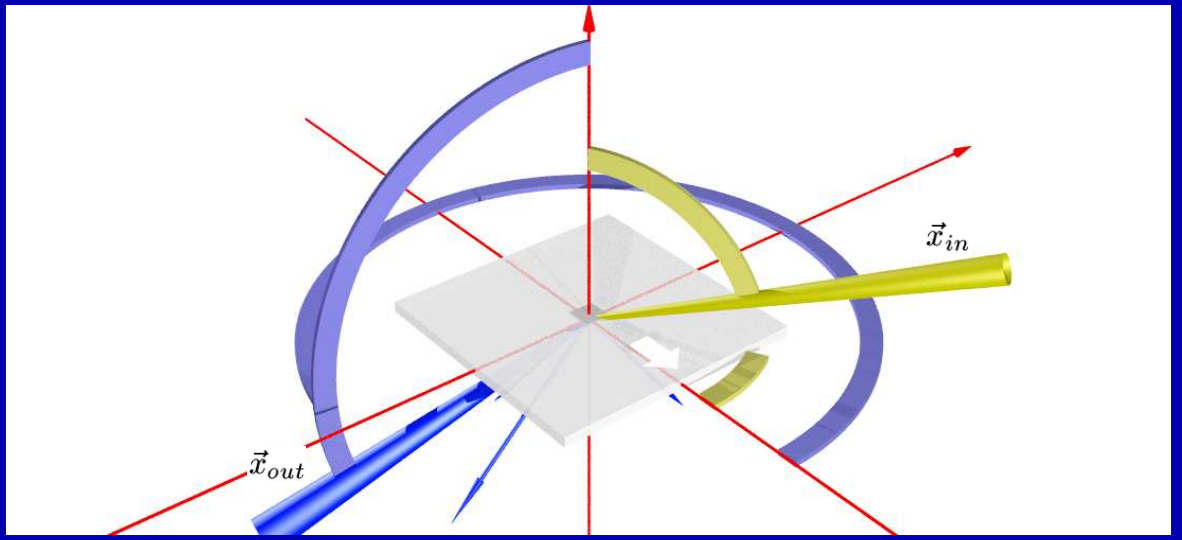
www.pab–opto.de

www.brtf.info

brtf definition

bidirectional reflexion transmission function

$$\mathcal{L}_{out}(\vec{x}_{out}) = \int_{\vec{x}_{in}}^{\Omega_{in}=4\pi} BRTF(\vec{x}_{out}, \vec{x}_{in})\, \mathcal{L}_{in}(\vec{x}_{in})\ \cos(\alpha_{in})\, d\Omega_{in}$$



the brtf user side:

```
void plastic p1
0
0
5     0.2  0.33  0.15    0.1 0.02
```

```
void trans window5mat
0
0
7  0.9  0.9  0.9  0.1 0.2  0.5 0.01
```

```
void metal lightshelf6
0
0
5     0.2  0.33  0.15    0.99 0.01
```

the brtf user side:

```
void plastic p1
0
0                                   ?
5    0.2  0.33  0.15  0.1 0.02
```

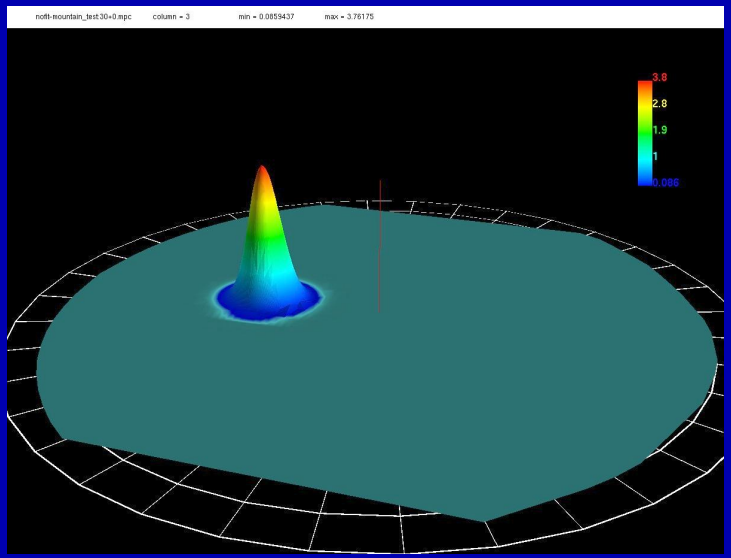
```
void trans window5mat
0
0                                   ?
7  0.9  0.9  0.9  0.1 0.2  0.5 0.01
```

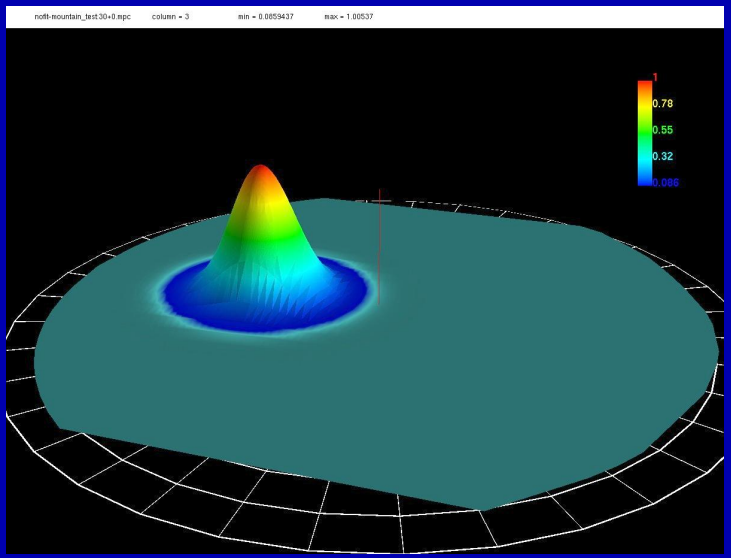
```
void metal lightshelf6
0
0                                   ?
5    0.2  0.33  0.15  0.99 0.01
```

the brtf user side: plastic example

```
void plastic p1
0
0
5    0.3  0.3  0.3   0.1  0.05
```

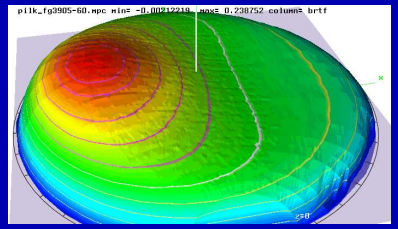
```
void plastic p2
0
0
5    0.3  0.3  0.3   0.1  0.1
```





parameter sources for brtf models

- **gonio–photometer measurements**



- **manual measurements**
- **feedback via images**
- **'standard' values**

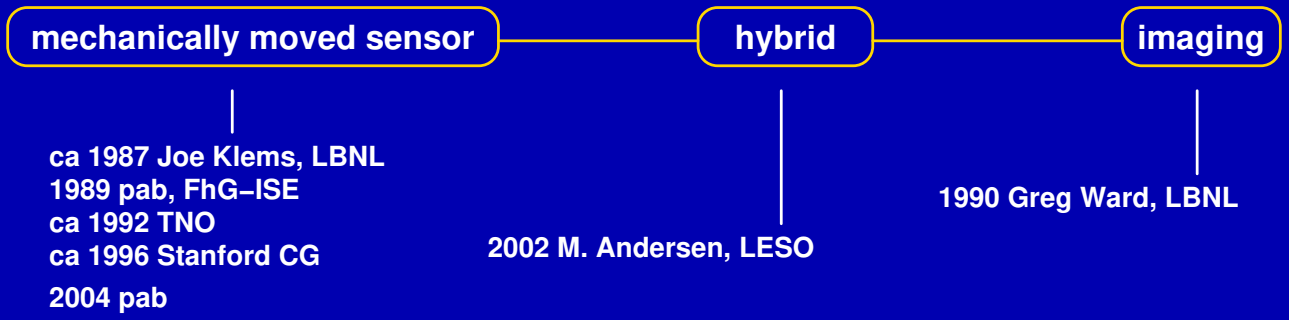
math. processing

void plastic p1
0
0
5 **0.2 0.33 0.15 0.1 0.02**

gonio–photometer requirements & designs

- general
- reliable
- fast
- precise

- primary design choices:



(not a complete list)

pab gonio–photometer

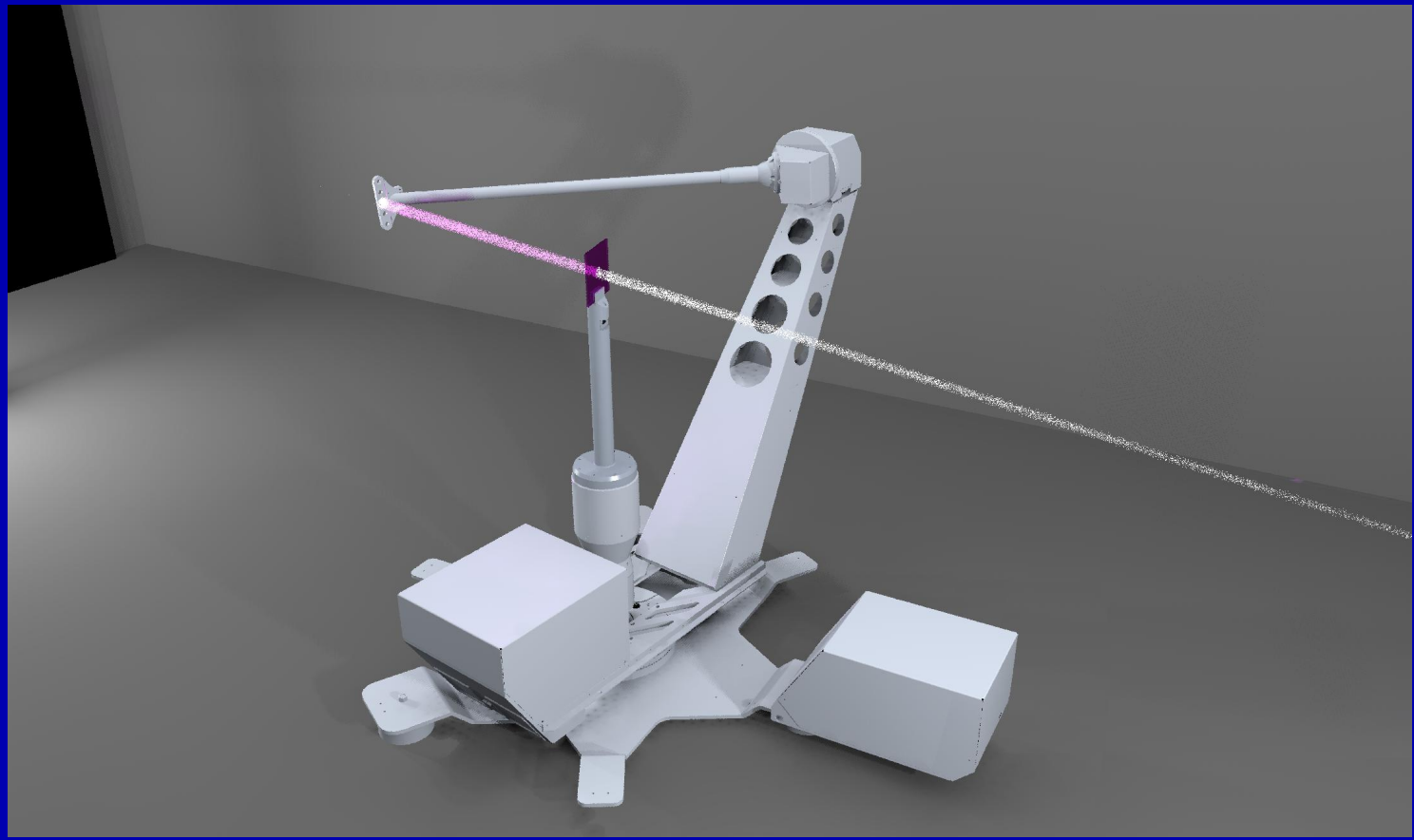
1989 – FhG–ISE gonio–photometer

pab gonio–photometer

2004 – pab gonio–photometer

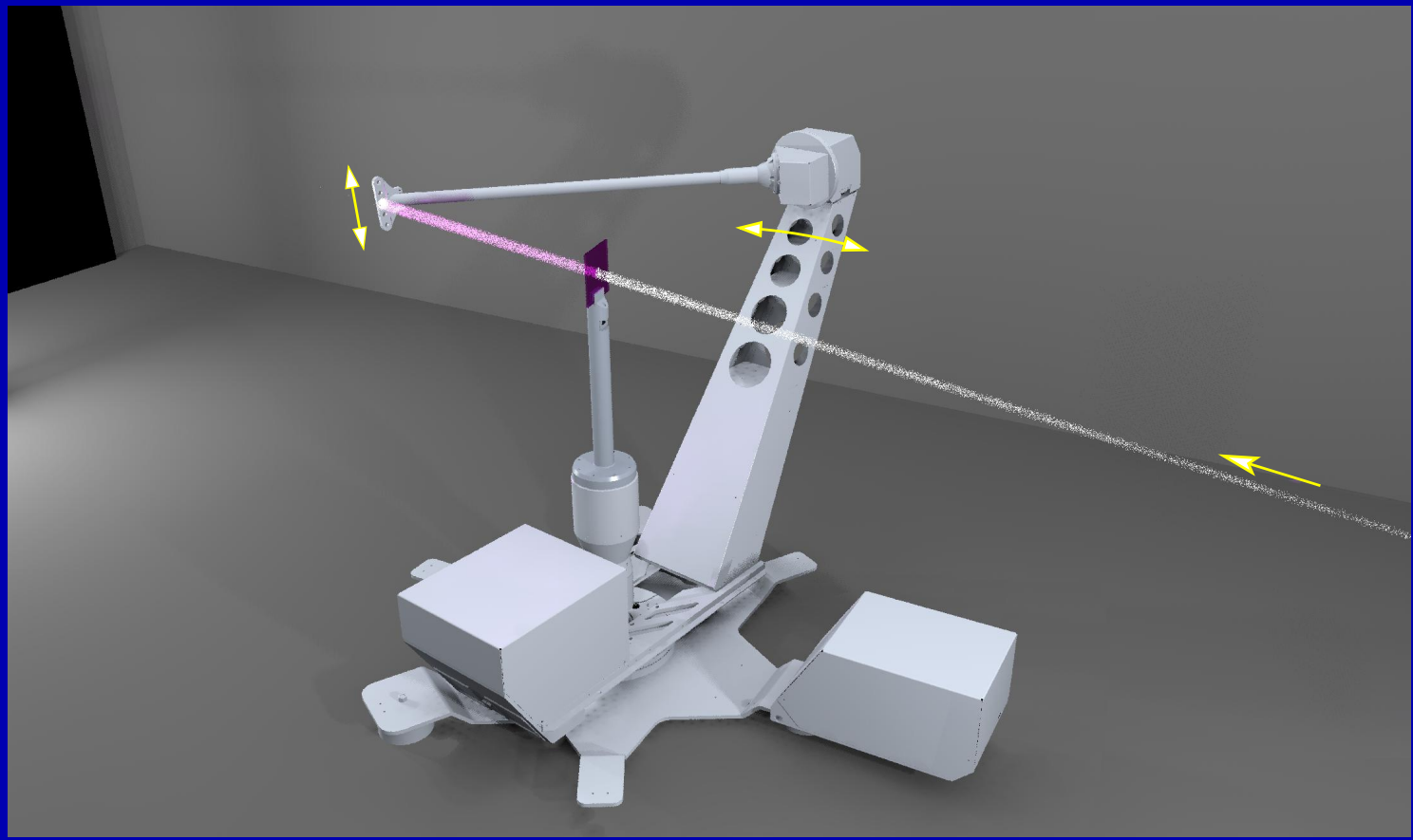
pab gonio–photometer 2004

physics meets engineering



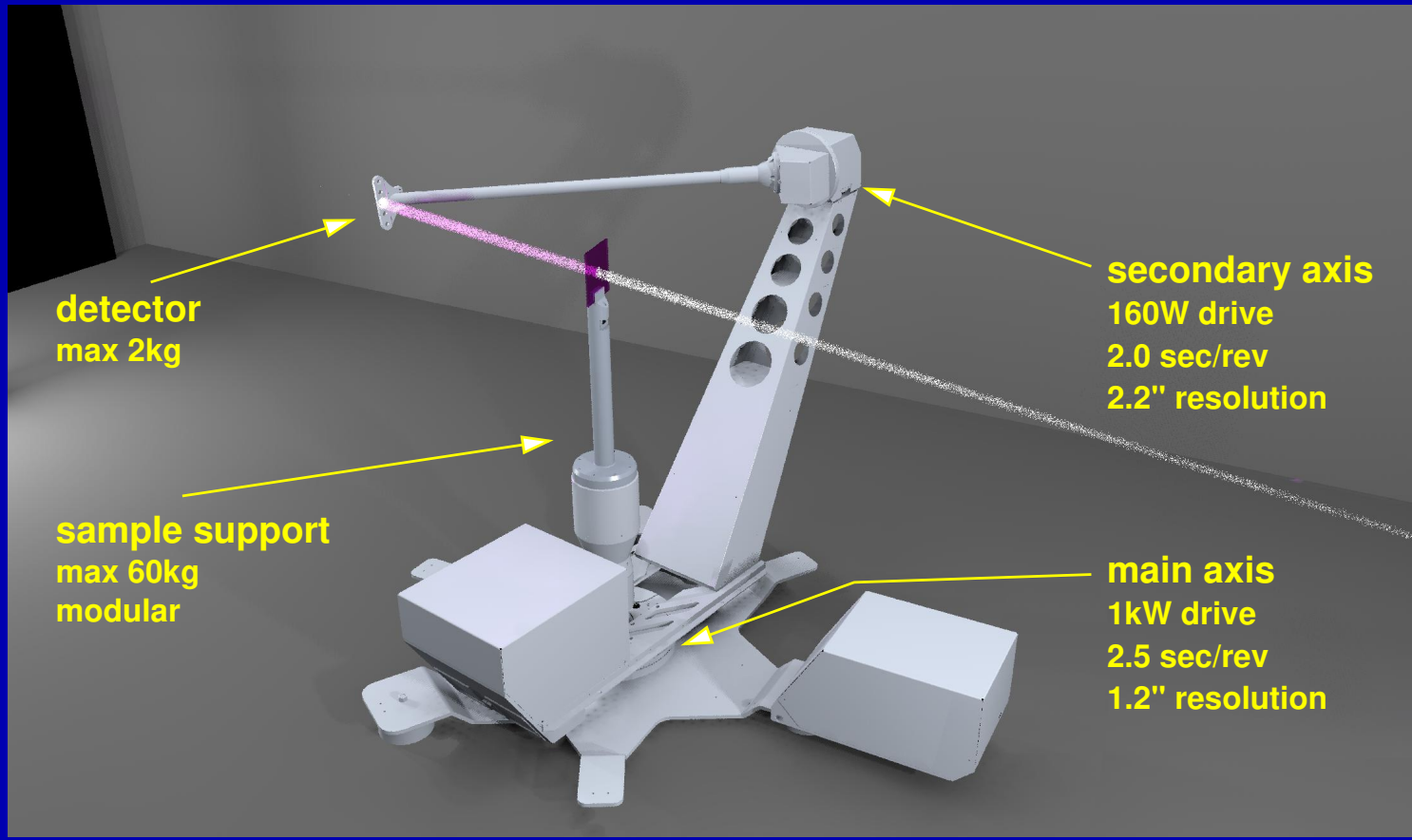
pab gonio–photometer 2004

physics meets engineering



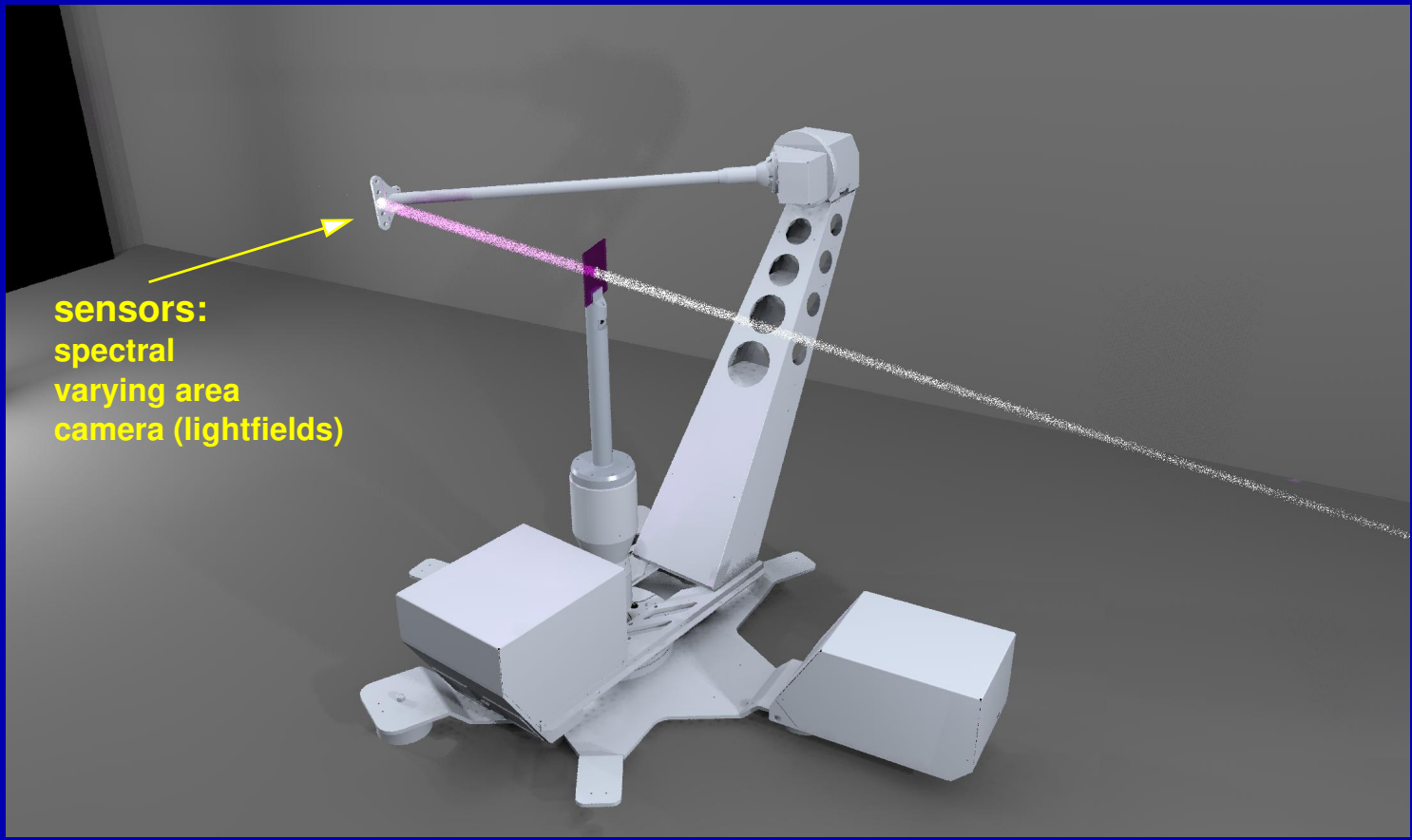
pab gonio–photometer 2004

physics meets engineering



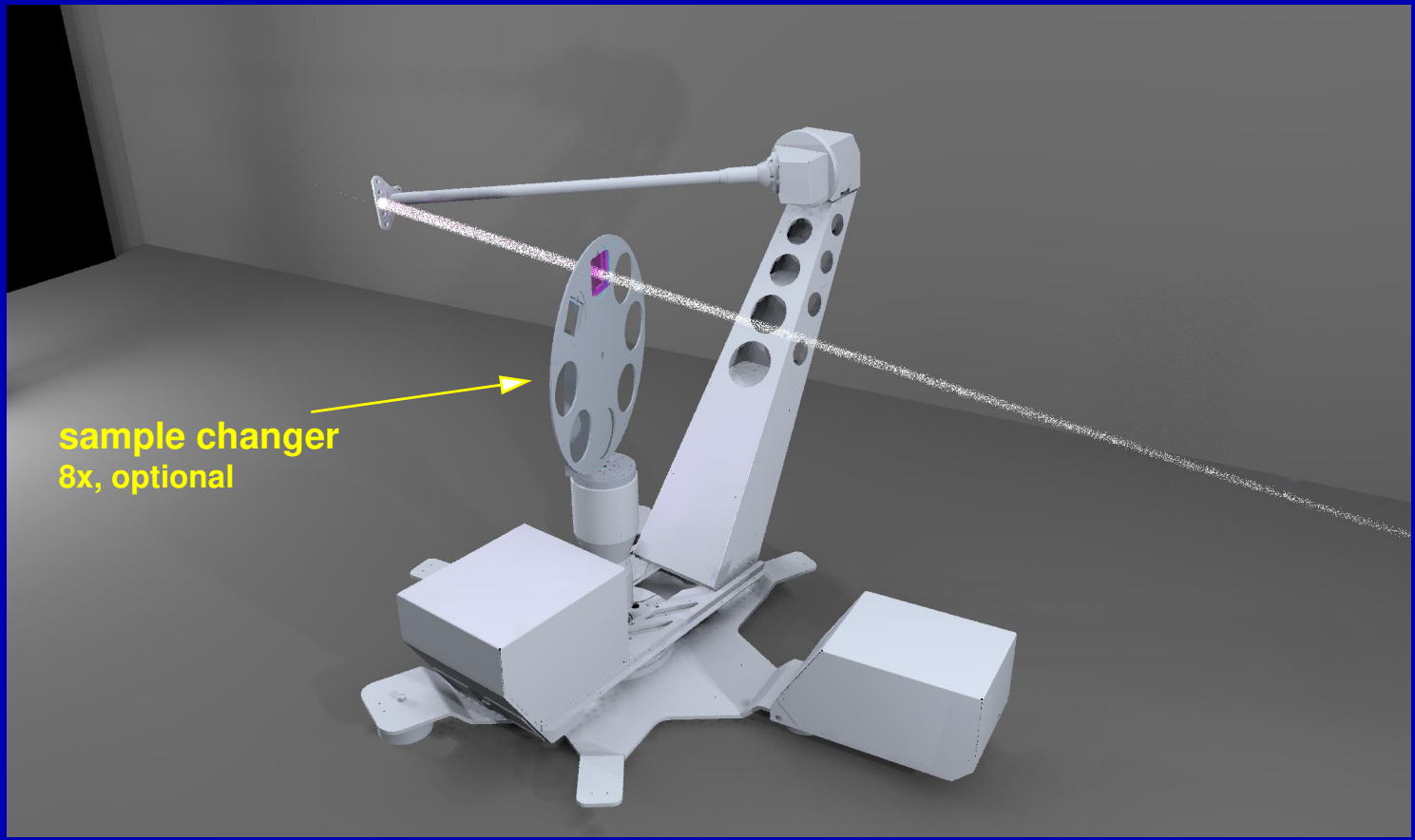
pab gonio–photometer 2004

physics meets engineering



pab gonio–photometer 2004

physics meets engineering



pab photo–goniometer 2004

advantages:

- machine tool drives & control
- arbitrary scan paths
- design&operating experience
- Linux controlled
- modular construction

increased speed
higher precision

faster measurements

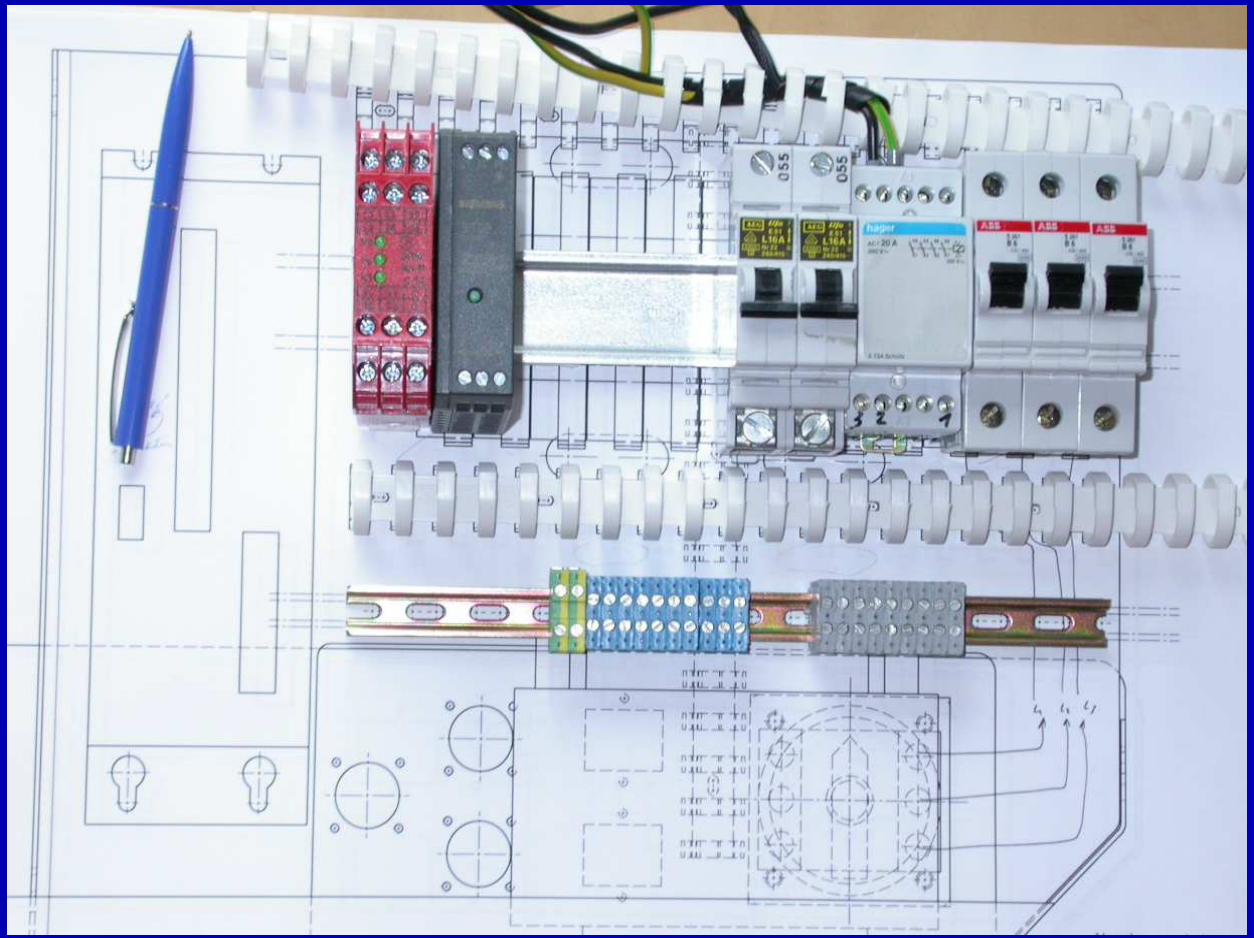
smoother construction

direct coupling of
sensor and motion

adaptable to special needs

pab gonio–photometer

development



pab gonio–photometer

development

pab gonio–photometer

development

→ **BRTF data**

→ **suitable material models**

→ **support for consulting**

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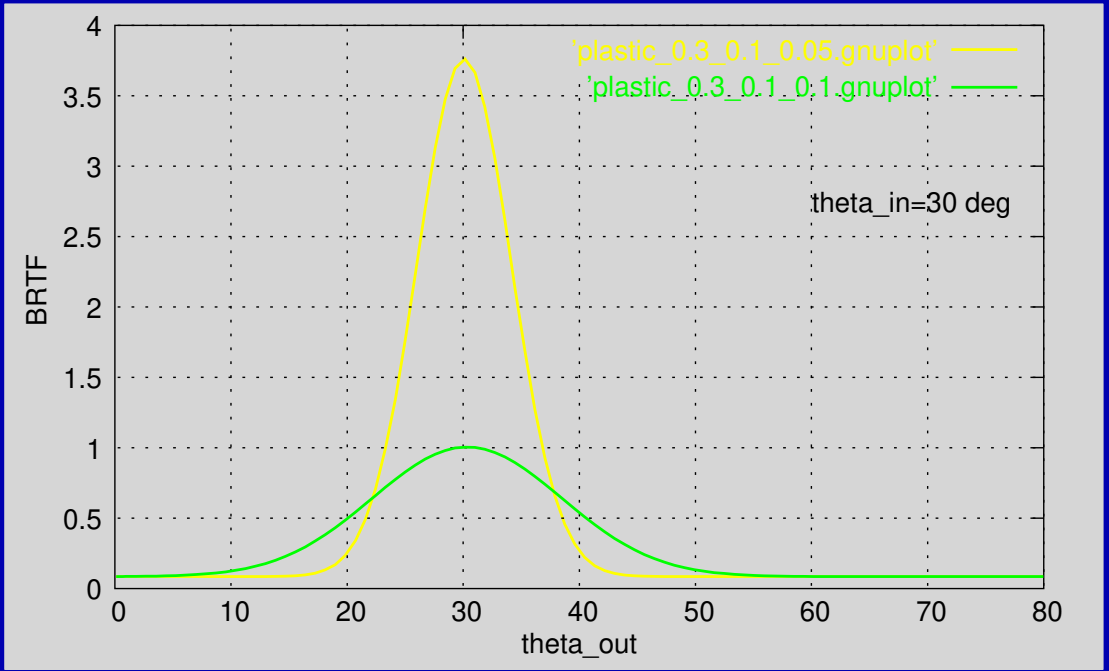
-
- many thanks for your attention
- happy rendering
- http://www.pab–opto.de

the brtf user side: plastic example

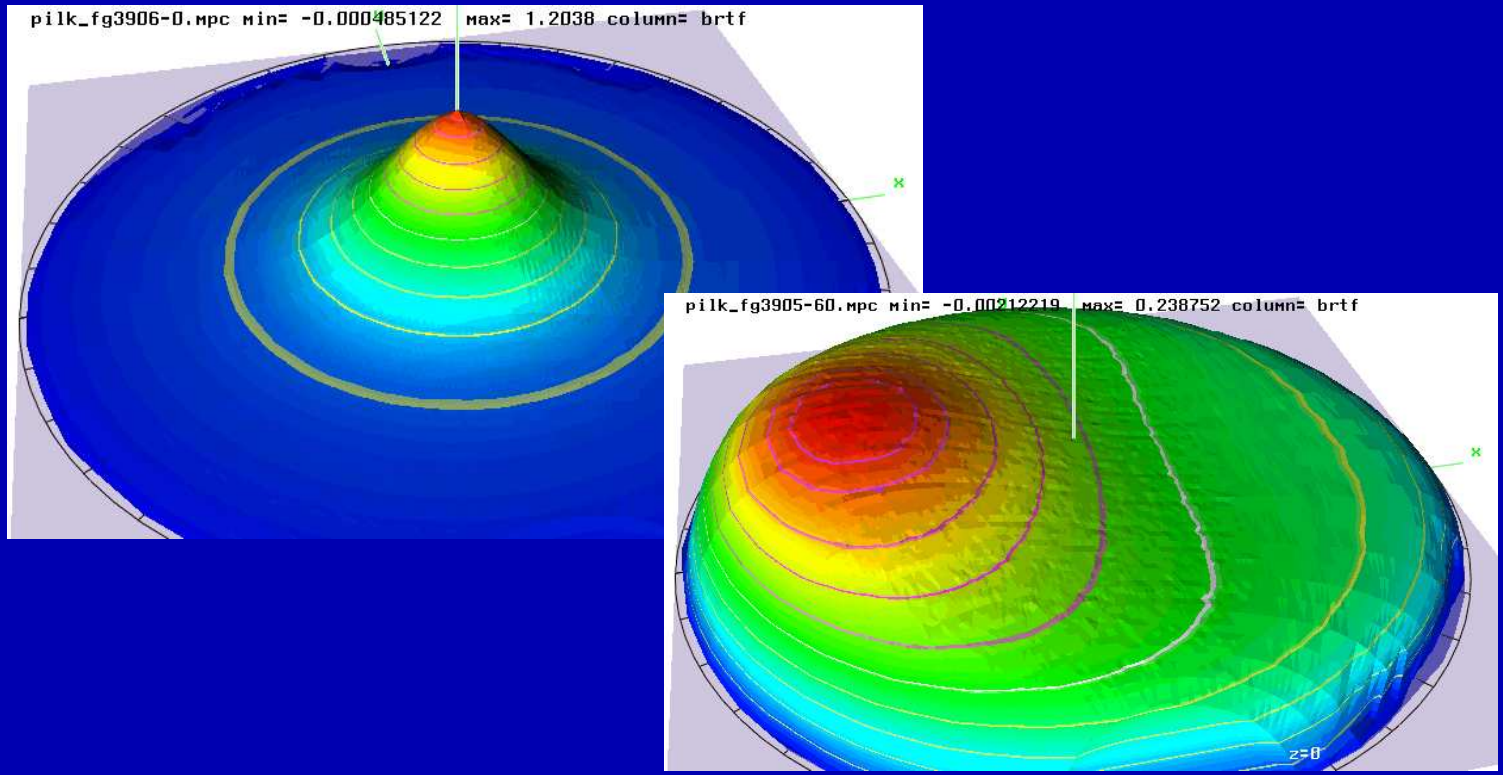
```
void plastic p1
0
0
5    0.3  0.3  0.3  0.1 0.05
```

```
void plastic p2
0
0
5    0.3  0.3  0.3  0.1 0.1
```



brtf types:

smooth brtf



brtf types:

complex brtf