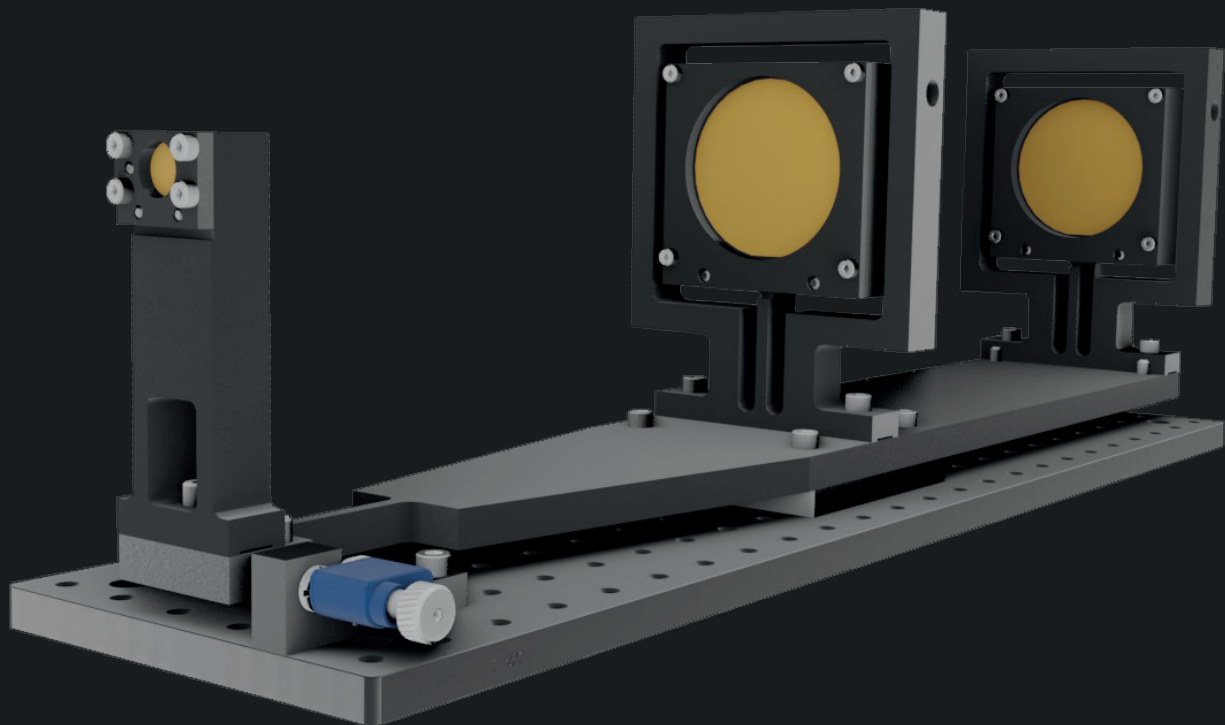


Talint-EDU – Technical description

Talint-EDU is a smartly simplified form of an X-ray Talbot-Lau interferometer consisting of all the necessary hardware to set up and fine tune the interferometer properly as well as to apply a phase stepping procedure which is required to obtain the three imaging modes: absorption, phase-contrast and dark field contrast.

The hardware is designed such that, after assembling the (pre-mounted) kit following our instructions, first Moiré fringes will readily be visible on your detector. Further fine-tuning of the Moiré fringe pattern can be done in a straightforward manner by angular rotation of the gratings around the optical axis using the micrometer screws in the G1 and G2 holders. Period, distances and design energy follow the formulae as described for example in [Bech 2009].



Characteristics of Talint-EDU

Total length Total width Total height	60 cm 15 cm 20 cm	Defined by base plate which is a breadboard with M6 and spacing of 25mm
Mounting		On customer's optical table, breadboard or any posts fitting to 25mm spacing of Talint-EDU breadboard
G0-G1 and G1-G2 distances	29 cm	Fixed via precision dowel pins; symmetric setup!
Option 1: Design energy Period of all 3 gratings Angular sensitivity (grating period over inter grating distance)	40 keV 6.0 μm 21 μrad	Talbot order 1
Option 2: Design energy Period of all 3 gratings Angular sensitivity	21 keV 4.8 μm 16 μrad	Talbot order 3
Open area of gratings	G0: 15 mm \emptyset G1: 70 mm \emptyset G2: 70 mm \emptyset	
Fine tuning of the interferometer	Only the adjustment of the G1 and G2 rotation angle around optical axis	Both gratings can be rotated around the optical axis with precision adjustment micrometer screws
Sample placement	Simple rotating table to swing sample in and out of the optical axis	Close to G1, either side of it
Phase stepping	Closed loop piezo stage. 30 nm resolution	Controller is included
Fringe visibility	Typically >15%	visibility map will be provided upon delivery of the system

Grating characteristics

The gratings are fabricated using the X-ray LIGA technique which ensures high precision and extreme height to width ratios (aspect ratios). Further grating characteristics are described in the following table. Detailed description of the grating parameters will be provided for the specific set of gratings delivered with the Talint-EDU kit.

Built-in curvature of gratings to prevent shadowing	G0: 75 mm G1: 365 mm G2: 655 mm	Source to G0 distance of 75 mm for best transmission
Absorber and heights of G0 and G2	Electroplated Gold height > 120 μm (40 keV) > 40 μm (21 keV)	Residual transmission through grating lamellae <5% at the design energy
Duty cycle of G0 and G2	0.55	Tolerance range of duty cycle 0.5 to 0.6
Substrates of G0 and G2	400 μm graphite	
Phase shift material and height of G1	Gold 7.7 μm (40 keV) Nickel 7.4 μm (21 keV)	Designed to produce pi phase shift with negligible attenuation
Duty cycle of G1	0.5	Tolerance range of duty cycle 0.45 to 0.55
Substrate of G1	Silicon 200 μm	Scatter-free, double side polished substrate

Have any further questions? Get in touch.

+49 721 619.09.562

info@microworks.de