

Optomech. Module

4 (custom) lenses

1 filter with 5nm FWHM

1 polarizer

Detector

Hamamatsu MPPC S14520SPL
6x6 mm², cooled

Front-end electronics

MUSICR1:
8 channel Multiple Use IC
for SiPM anode readout

Amplifier for analog mode output

MiniCircuits ZX60-P103LN+

Time tagger unit for photon counting output

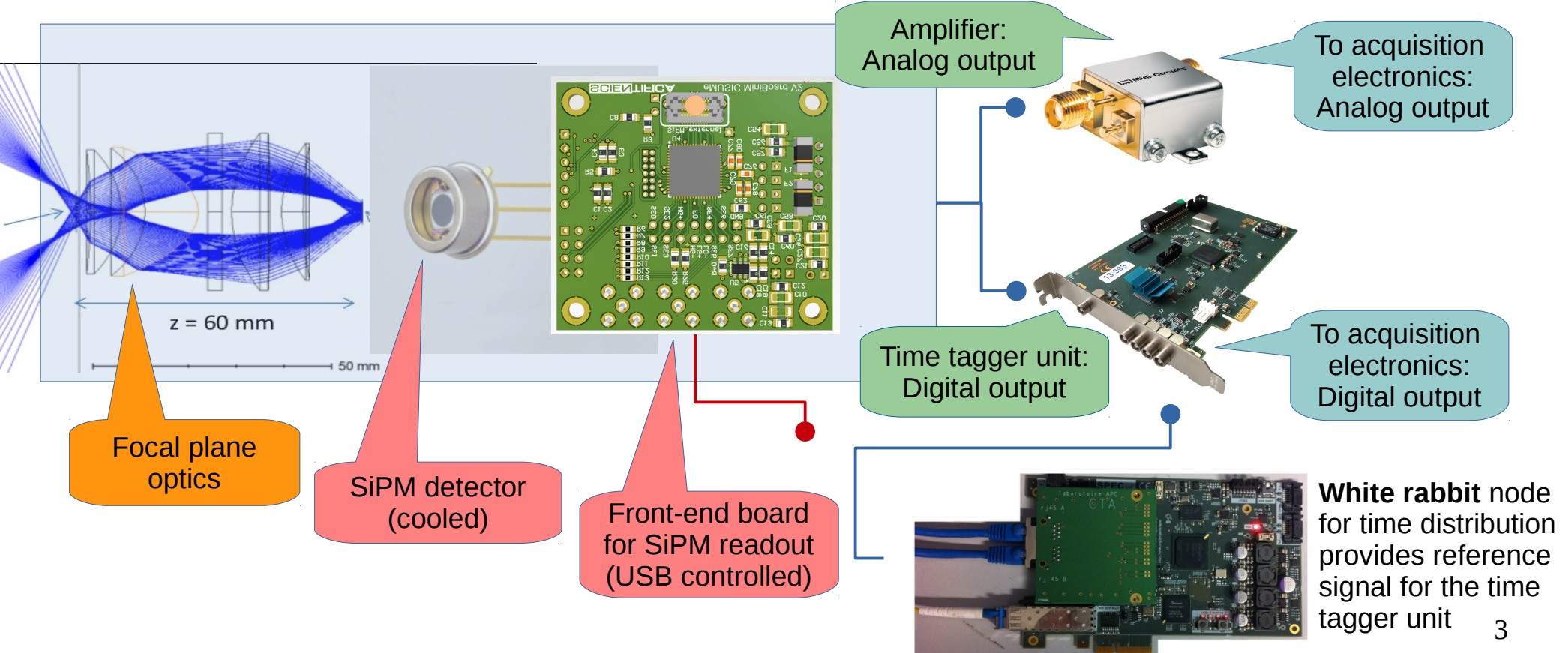
Cronologic TimeTagger4-2G

Telescope interfaces

1. Power supply with 12V or 24V + power supply board
2. USB cable
3. Two double shielded coaxial cables (SMA connector for anal. output, LEMO connector for dig. output)

Photon Detection module for Intensity Interferometry (PDMII) for the ASTRI telescope and camera - Design, specifications, costs - v. 4.0 - Jun 1, 2019

ASTRI Int. Interf. WG (L. Zampieri, G. Naletto, G. Bonanno, E. Giro, G. Rodeghiero, C. Gargano)



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Detector

Hamamatsu MPPC S14520SPL
6x6 mm², cooled

Specs:

Dark count rate = 150 kcounts/s
Size: 15.3 x 15.3 x 22.3 mm³
Operating voltage: 41 V

Cost: 700 Euro per unit

Front-end electronics MUSICR1:

8 channel Multiple Use IC
for SiPM anode readout

Specs:

Max rate (analog) = 150 MHz
Max rate (digital) = 50 MHz
Size: 50 x 45 x 1.6 mm³
Operating voltage: +/-6.5 V
Additional USB UART board
for output and other controls
Size (incl. USB board):
~ 50 x 45 x 45 mm³
Output connector: strip or SMA
Output sig. (digital): TTL (<20 ns)

Cost: 800 Euro per unit

Amplifier

for analog mode output
MiniCircuits ZX60-P103LN+

Specs:

Bandwidth: 50 to 3000 MHz
DC Supply Voltage: 5.0 V
Size: 29.97 x 18.80 x 11.68 mm³
Input/Output connectors: SMA
Input/Output signal: TTL

Cost: 100 Euro per unit

**Time tagger unit
for photon counting output**

Cronologic TimeTagger4-2G

Specs:

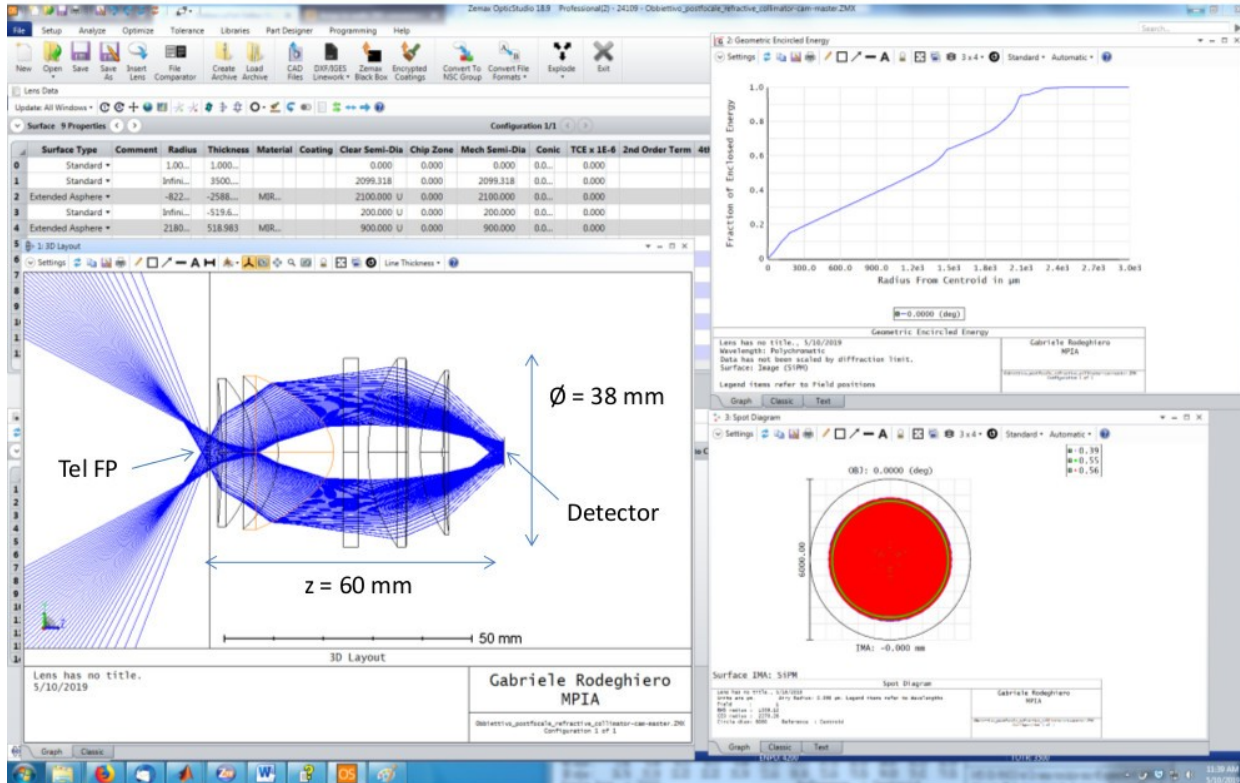
Frequency bandwidth: 48 Mbits/s
Size: ... mm³
Jitter: ... ps
Input/Output connectors: LEMO
Input signal: TTL
Output signal: ...

Cost: 2450 Euro per unit

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ASTRI Int. Interf. WG (L. Zampieri, G. Naletto, G. Bonanno, E. Giro, G. Rodeghiero, C. Gargano)

Design activity on the optics and optomechanical module (G. Rodeghiero, C. Gargano)



Prototype of focal plane optics redesigned to fit inside a camera module

Size: Diameter 38 mm, Depth (z) 60 mm

Contains 1 aspherical lens with custom design (Claudio Pernechele was involved)

Windows above the focal plane still to be included in the final design

Test with the 'camera x luce tecnica'

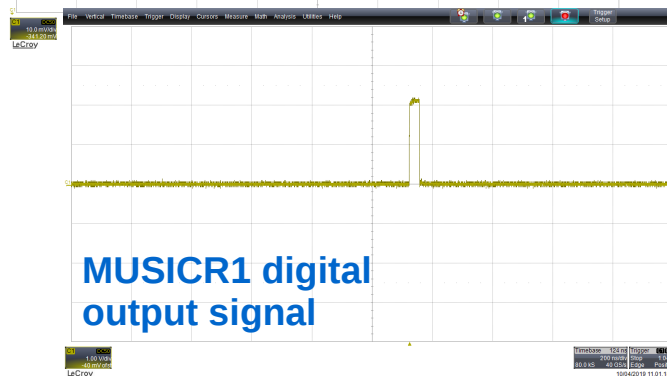
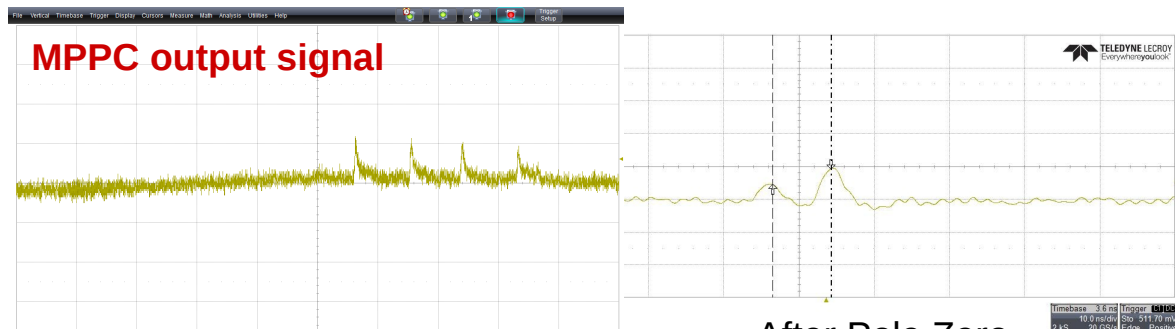
How much space is required for detector and front-end electronics?

We can probably overcome this limitation making a hole in the camera housing

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ASTRI Int. Interf. WG (L. Zampieri, G. Naletto, G. Bonanno, E. Giro, G. Rodeghiero, C. Gargano)

Testing activity on a prototype of the front end electronics with a 3x3 mm² MPPC detector carried out in Catania (G. Bonanno)



After Pole Zero Cancellation (PZC) two pulses detected at 7 ns (analog output), corresponding to 130 MHz

Some problems with the 'discriminator' for the digital output

Design activity on the acquisition electronics (L. Zampieri, G. Naletto)



Studied feasibility of an acquisition system based on the White Rabbit (WR) signal for time synchronization (in collaboration with Aldo Morselli and Gonzalo Rodriguez)

The idea is to use the PPS from the ASTRI telescope WR board for providing a synchronization and reference signal

PPS signal from WR board and digital output from MUSIC board are sent to an external TDC streaming data continuously to disc at the digitizer rate

TDC requirements: 1 ns time resolution, 1 ns double hit resolution, 32 bits per event (role over every 2 s), high bandwidth (~60 MHz), at least 2 input ports (PPS from WR, output from MUSIC)

To be checked: stability internal clock over 1 s, internal jitter, availability of mode with 32 bits per event