

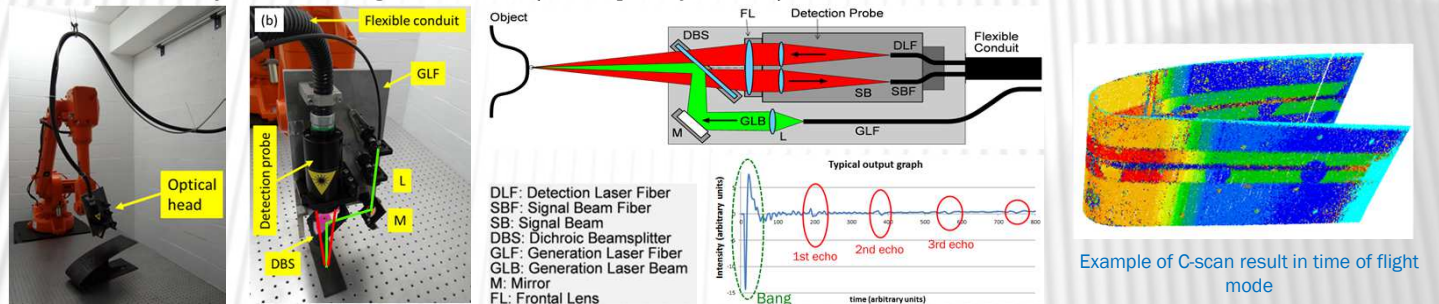
# Laser Ultrasound for NDT: investigation of the generation beam shape

F. Languy\*, A. Perrard, J.-F. Vandenrijt and M. P. Georges  
 Centre Spatial of Liège – STAR Institute – University of Liège (Belgium)

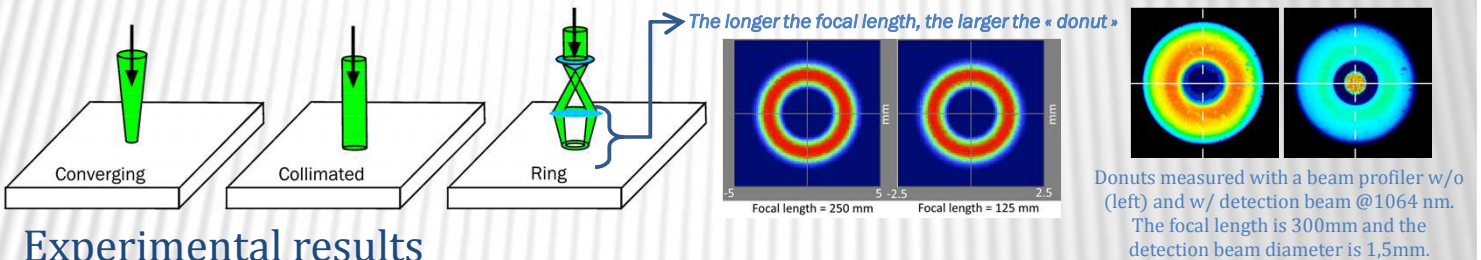
\* [flanguy@ulg.ac.be](mailto:flanguy@ulg.ac.be)

## Introduction

We developed a full fiber-coupled laser ultrasound robotic system to investigate defects of complex shape CFRP objects. The ultrasound is generated by a pulsed laser at 532 nm and the amplitude of vibration of the sample is detected by an interferometric system working at 1064 nm (developed by Tecnar).

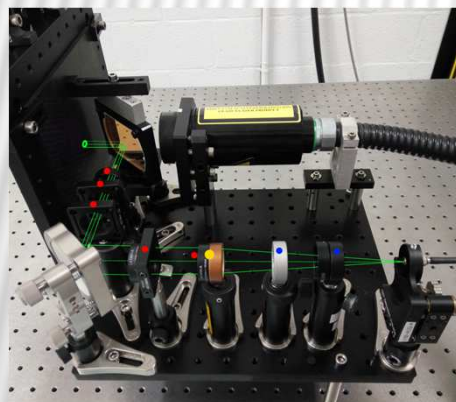


In order to optimize the SNR of the echoes, we compared three different kinds of generation beam shape



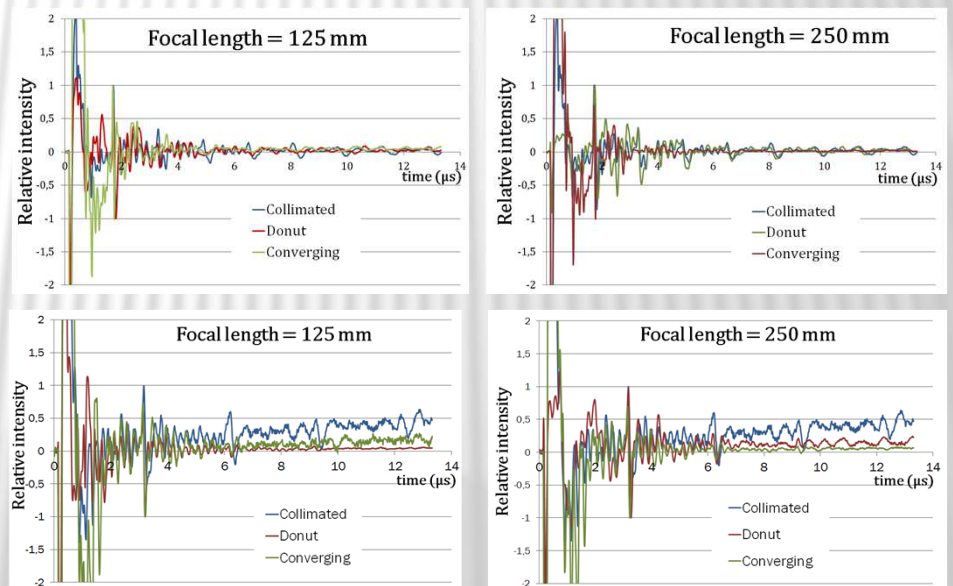
## Experimental results

The peak irradiance on the sample had to be reduced to avoid any damage on the CFRP sample. The graphs have been normalized with the peak value of the first echo as reference. We compared 5 different focal lengths (only two are presented here) from 100 to 300 mm on two samples of different thickness (2.45mm & 4.50 mm) so that the donut inner diameter was between 1 and 3 mm.



### Optical setup:

- Lens holders
- Neutral densities holders
- Collimating lens (+axicon)



## Conclusions

The use of a collimated beam provides echoes with higher SNR (the second echo is easier to observe with the collimated beam), moreover a collimated system is easier to implement than the two other systems.