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**From Prehistory of PIV to Recent DGV,
through 40 Years of LDV**

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History of my laser velocimetry activities started in 1970 with a series of tests in the R4 facility of Modane-Avrieux centre of ONERA, i.e nearly 40 years ago.

The objective was to measure velocities in a propulsion device simulator. It's the first time that a kind of PTV system has been employed. The flow was illuminated by a laser sheet issued from two different lasers: a Q-Switched laser delivered two or three pulses in order to mark the positions of the particles (recorded by a camera) and a free running laser was used to create on the film a straight line allowing to find upstream the dots due to the pulses (we should call that now image encoding). All the processing was done manually, with an original and human synchronisation system.

Then there has been the long development of LDV, going from 1D to 2D and finally operational 3D systems. With the flexible apparatus developed at ONERA, it has been also possible to perform spatial correlations on hot jets, with large movement displacements. The most outstanding application of 3D laser velocimetry took place in 1994 at DNW, where two 3D set-ups were simultaneously installed on platforms 10 m high, in order to characterize the vortex interaction with rotor blades of a helicopter: DLR device was investigating advancing blade and ONERA device the retreating blade. Seeding problems and other synchronization systems left very deep souvenirs to all the scientists who contributed to this one month campaign.

In laser velocimetry history, the development of time of flight instruments dedicated to turbine investigation has been also very important: it was necessary to improve the signal to noise ratio in order to get velocity information in narrow channels where the presence of walls very close to the probe volume created a lot of stray light. One family of instruments is very famous: the L2F developed by DLR. At ONERA we have also developed a mosaic laser velocimeter for large facilities and air intakes.

Finally DGV appeared in the 1990's for application in large facilities and for high velocities. In spite of many efforts of a few expert teams through the world, the commercial development did not occur, so that it remains a very useful technique providing real time velocity maps for people who have kept expertise of DGV.

In conclusion, we may outline the main characteristics of the various techniques which must be considered as providing complementary information:

- LDV performs local measurements with very high data acquisition rates, allowing assessing fluctuation spectra of turbulence;
- PIV provides snapshots of instantaneous velocity maps, allowing pointing out instabilities or intermittence effects;
- DGV is able to provide real time mean velocity maps, and is more appropriate for large facilities and high velocity flows;
- L2F is the quasi unique instrument able to perform velocity measurements in turbines.