Dynamics of the Super Aco Free Electron Laser Measured with a Double Sweep Streak Camera, M. BILLARDON, CNRS; R. BAKKER, M.E. COUPRIE, B. VISENTIN, SPAM/LURE; D. GARZELLA, R. ROUX, LURE; H. HAMA, UVSOR; T. HARA, SPRING8; J. ROUX, Hamamatsu France - Dynamical studies have been carried so far on the Super ACO storage ring in the UV with a dissector and streak cameras, i.e., measurements of the laser micro pulse duration vs. detuning (synchronism between the positron bunches circulating in ring and the light pulses stored in the optical resonator) and the micro pulse jitter. The latter is more important close to perfect synchronism and being partially responsible of the laser saturation. For this, a longitudinal feedback system has been installed which actively synchronises the circulating electron bunches with the optical pulses. Next, a Hamamatsu double sweep streak camera (C5680) provided accurate diagnostics, e.g., as the laser evolves in time, sub micro-pulses can be observed at the same time. In addition, the laser operating in the Q switched mode (at first two pulses are detuned then the synchronism is re-established very quickly leading to high peak power) can be followed at millisecond scale. Hence, the double sweep streak camera allows us to reach a better understanding in the dynamical behaviour of the FEL which provides the means to improve laser performance.