

Laser with controlled coherence for metastable ^3He polarization

AZURLIGHT
SYSTEMS

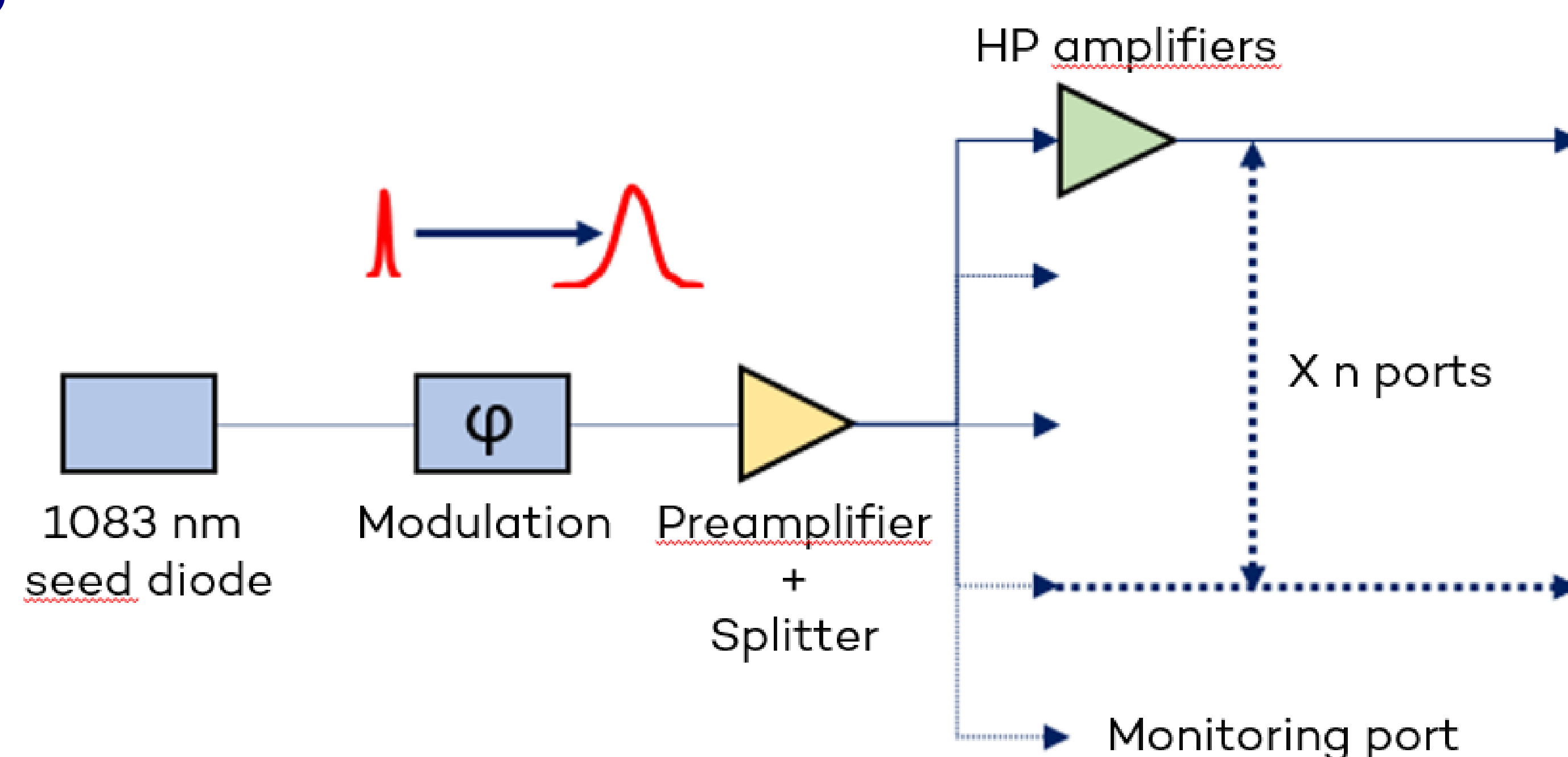
C.Dixneuf¹, G. Guiraud¹, Q. Rosa¹, P. Laygue¹, N.Traynor¹

¹Azurlight Systems, 11 avenue de Canteranne, 33600 Pessac, France

1. Abstract

Optical pumping in MEOP stations requires lasers. Azurlight Systems has developed a novel optical architecture that provide 2 major improvements: a tailored spectral linewidth that matches the absorption spectrum of the gas and a continuous Gaussian type envelope without any direct longitudinal mode. This architecture is also scalable to multiple outputs and very high power.

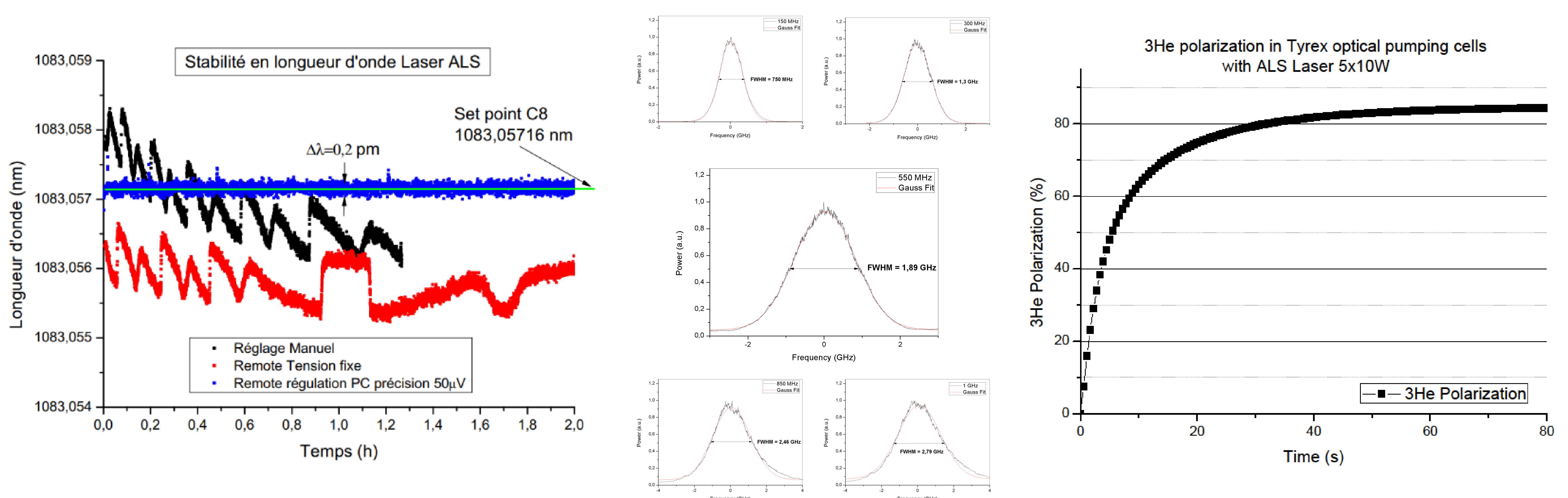
2. Architecture & Results



The seed diode is a single frequency low noise ECDL with enough tunability to reach hyperfine lines of ^3He C8 and C9. One can easily set a servo loop to guarantee a frequency stability of $<0,2$ pm over hours.

The modulation setup enables well controlled spectral broadening (from 500 MHz to 3 GHz). For ^3He , the optimum linewidth is around 1,9 GHz. Also, the spectrum doesn't show any longitudinal mode.

The broaden seed can then be splitted in multiple ports and amplified by standard Azurlight Systems high power amplifiers. Each output will then be identical.



3. Conclusions & Acknowledgments

With this laser, it has been demonstrated that it was possible to double the production rate of polarized ^3He to 2,5 bar.liter/hour and to push the polarization rate to 80%.

This technique is not limited to ^3He can be adapted to other gases.

Azurlight Systems thanks Mr. David Jullien of ILL, Grenoble, Dr. Genevière Tastevin and Dr. Pierre-Jean Nacher of LKB, Paris for their precious advice and support.