Tableau 1

	FRITE's NAME : FRITE MUSE - Formation, evolution and detection of galaxies							
Supervisor	D. Mary							
Tutors	E. Slezak, D. Mary							
Possible FRITE-slot(s). Indicate if repetition possible	F2, F3 or F5. Two occurrences at most.							
Required background	Physics : Quantum Mechanics and orbitals. Signal : maximum likelihood estimation.							
Theoretical/fondamental aspects	The FRITE contains two parts. The theoretical part provides a background in Cosmology with emphasis on galaxies' formation and evolution. The applications part focuses on how these galaxies are sensed and detected by the MUSE instrument.							
Related large instrument/project (if any)	MUSE integral field spectrograph @ VLT, Chile							
Keywords / Topics	X **Cosmology** **Turbulence** **Planetology** **Stellar Physics** **Relativity** **High Angular Resolution Instrumentation** **Numerical simulations** X **Signal/Image processing** **Mathematics** **OTHER :**							
Marks/evaluation mode	**Theory** : One final theoretical exam + 1 or 2 homeworks.							
	Applications : one final exam + numerical experiments on MUSE data.							
Documents/bibliography/on-line ressources	http://muse.univ-lyon1.fr/spip.php?article99							
	R. Bacon et al., « The MUSE 3D view of the Hubble Deep Field South », A&A 575A, 2015, http://adsabs.harvard.edu/abs/2015A%26A...575A..75B							
FRITE's description	*** Theory** : Formation and evolution of galaxies **Tutor**: E. Slezak **Topics**: Cosmology and Standard model. Quantum mechanics : Hydrogen lines. Classification of galaxies. **Overview** I. Basics in cosmology : the standard model and the evolution of the Universe II. Classification of galaxies (spirals, elliptics, active/non active). III. Dynamics in galaxies. Importance of observing young galaxies IV. Emission lines of Hydrogen. The Lyman series. V. Lyman alpha emitters and Lyman alpha forests. Quantum phenomena used to trace Universe on cosmological scales. VI. Formation and evolution galaxies as a major scientific goals of MUSE. Comparison of MUSE w.r.t. main existing surveys (HST,...). *** Application** : Detection methods applied to Lyman alpha emitters for the MUSE instrument **Tutor**: D. Mary **Topics**: MUSE instrument. Statistical models. Detection theory. **Overview** I. Main characteristics of the MUSE instrument: suitability of the instrumental design for detecting distant galaxie. Observing strategy and main characteristics of the resulting data cube. Survey of past/current instruments addressing the same problem. Major related ground based facilities/organisms (ESO, VLT etc). Integral-field spectrographs in Astronomy. II. Introduction to statistical decision theory. Neyman-Pearson theorem, ROC curves, binary vs multiple hypothesis testing. III. Composite hypotheses. The GLRT. IV. Application to the detection of Lyman alpha emitters. Statistical models for MUSE data cubes.							