On the origin of variable structures in the winds of hot luminous stars

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Examination of the temporal variability properties of several strong optical recombination lines in a large sample of Galactic Wolfâ€“Rayet (WR) stars reveals possible trends, especially in the more homogeneous WC than the diverse WN subtypes, of increasing wind variability with cooler subtypes. This could imply that a serious contender for the driver of the variations
is stochastic, magnetic subsurface convection associated with the 170 kK partial-ionization zone of iron, which should occupy a deeper and larger zone of greater mass in cooler WR subtypes. This empirical evidence suggests that the heretofore proposed ubiquitous driver of
wind variability, radiative instabilities, may not be the only mechanism playing a role in the stochastic multiple small-scaled structures seen in the winds of hot luminous stars. In addition to small-scale stochastic behaviour, subsurface convection guided by a global magnetic field with localized emerging loops may also be at the origin of the large-scale corotating interaction
regions as seen frequently in O stars and occasionally in the winds of their descendant WR
stars.

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