In this talk, we discuss on regularity theory for general parabolic system

$$\mathrm{u}_t - \mathrm{div}\, A(Du) = 0 \quad \text{in} \ \ \Omega_T = \Omega \times (0, T],$$

where $u : \Omega_T \to \mathbb{R}^N$, $u = u(x,t)$, is a vector valued function and the nonlinearity $A : \mathbb{R}^{nN} \to \mathbb{R}^{nN}$ satisfies a general Orlicz growth condition with exponents p and q with $\frac{2n}{n+2} < p < q$. Note that if $p < 2 < q$ we cannot determine the degeneracy of the system.

I will present our recent regularity results for the gradient Du of a solution of the above system, which are higher integrability of Du, Hölder continuity of Du when $A(\xi)$ satisfies the Uhlenbeck structure, i.e., $A(\xi) = \frac{\varphi'(|\xi|)}{|\xi|}\xi$, and partial Hölder continuity of Du. These are joint works with Peter Hästö from University of Turku, and Giovanni Scilla and Bianca Stroffolini from University of Naples, Federico II.