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Axion relics in non-standard cosmologies

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I will review our recent findings in axion production by considering a period before the onset of Big Bang nucleosynthesis that experimented a non-standard expansion. I will start with cold dark matter production through the misalignment mechanism, firstly assuming the energy density of the universe is dominated by a particle field described by a general equation of state. Secondly, I will refer to the case involving early matter domination by a scalar field with a time-dependent decay rate. In both scenarios, I will show the parameter space where the QCD axion is a dark matter candidate.
Finally, I will refer to axion thermal production during early matter domination or a late reheating era.

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