Abstract: Stars can be stretched and ripped apart by the super-massive black hole at the core of a galaxy. The remnant gaseous trail gradually circularizes in a ring of mass that spreads by the viscous forces into an accretion disc. In this thesis we have studied the spectral line profile time evolution of radiation reflected by the accretion disc located around a super-massive black hole. We assume the central body to be a slowly rotating or non-rotating super-massive black hole with no charge, in the first approximation represented by the Schwarzschild solution. In a sense of Shakura-Sunyaev standard accretion disc model with the kinematic viscosity parameter $\alpha \approx 1$ we allow the accretion disc evolution to be guided by the angular momentum transfer equation with the initial mass ring located at the tidal radius being the product of tidal disruption of a star passing by a super-massive black hole. During the simulations we keep varying the mass of the central body while we keep the mass and the radius of the star constant ($M = 1M_\odot$ and $R = 1R_\odot$), i.e. taking into account the solar-type stars only. We defer the prospects of the full analysis involving spin (and charge) of the central body for the future study as it will be necessary to use the equations for the redshift factor and the accretion disc evolution that correspond to the Kerr (or Kerr-Newmann) metric.