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Galactic Evolution STEWART BREKKE, Northeastern Illinois University (former grad student) — All galaxies began as spiral galaxies. The early universe began with sets of two or more pre-galactic arms orbiting each other. As gravitational attraction between the arms took effect, the fore-sections of the arms tangentially collided forming spiral galaxies when they attached with the orbital motion of the arms being converted to the rotational motion of the newly formed spiral galaxies or $(I\omega)_{arm1}+(I\omega)_{arm2}+...+(I\omega)_{armn} = (I\omega)_{galaxy}$. If the centripetal force on the arms is more than the gravitational force on the arms, the spiral galaxy remains a spiral galaxy i.e. $mv^2/r \geq Gm_{arm}m_{galaxy}/r^2$. If the galaxy is slowly rotating, the spiral arms collapse into the body of the galaxy because the gravitational force is greater than the centripetal force on the arms and an elliptical galaxy is formed i.e. $mv^2/r < Gm_{arms}m_{galaxy}/r^2$.

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