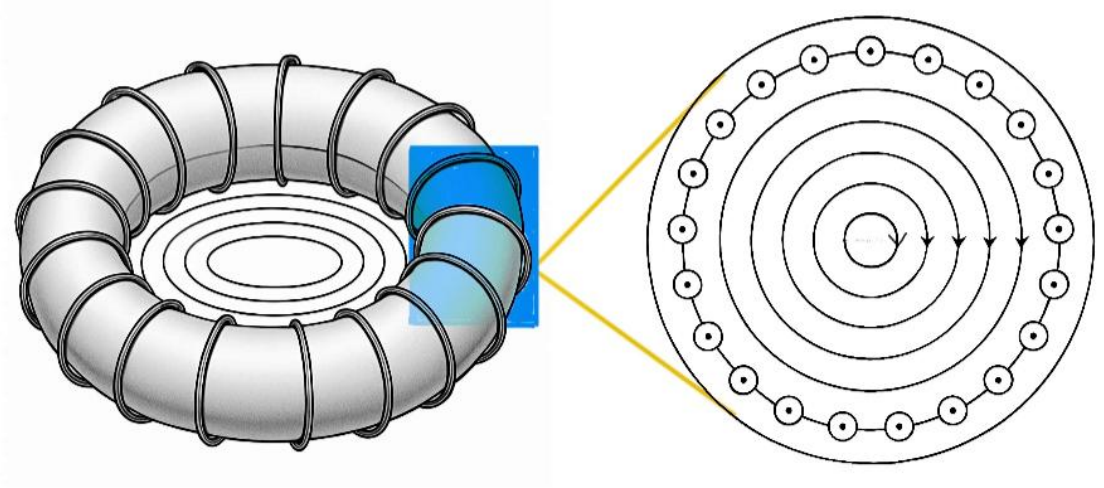
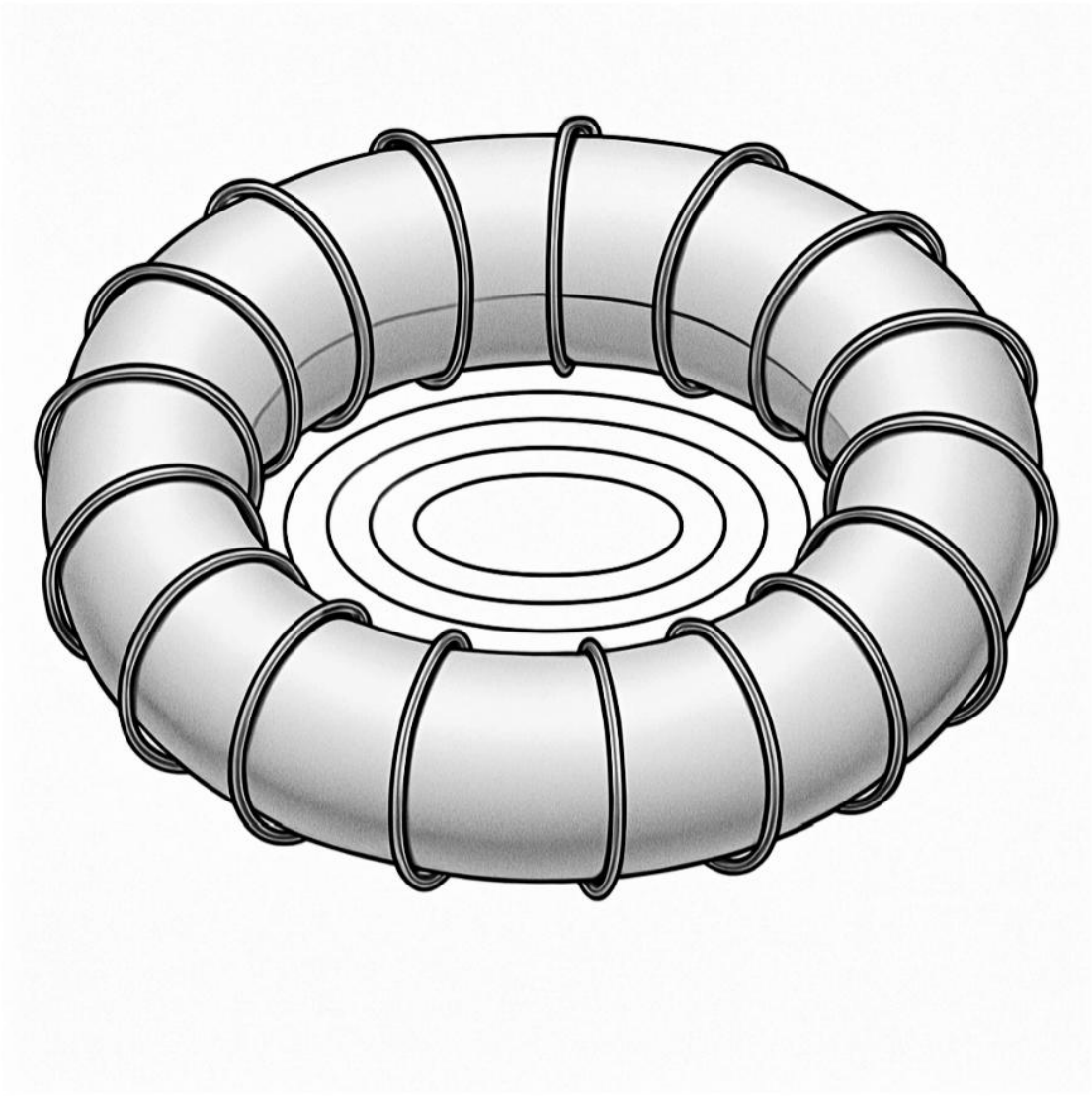
Poloidal Magnetic Field from Toroidal Coils (Synchrotron Application)

This document presents a clean, scientifically accurate, and publishable recreation of the magnetic field diagrams, essential for understanding the magnetic confinement in a synchrotron or tokamak-like device.

1. Toroidal Magnetic Field (3D View)

This diagram illustrates the **Toroidal Field (TF) Coils** wrapped around the torus and the resulting magnetic field.





Key Features:

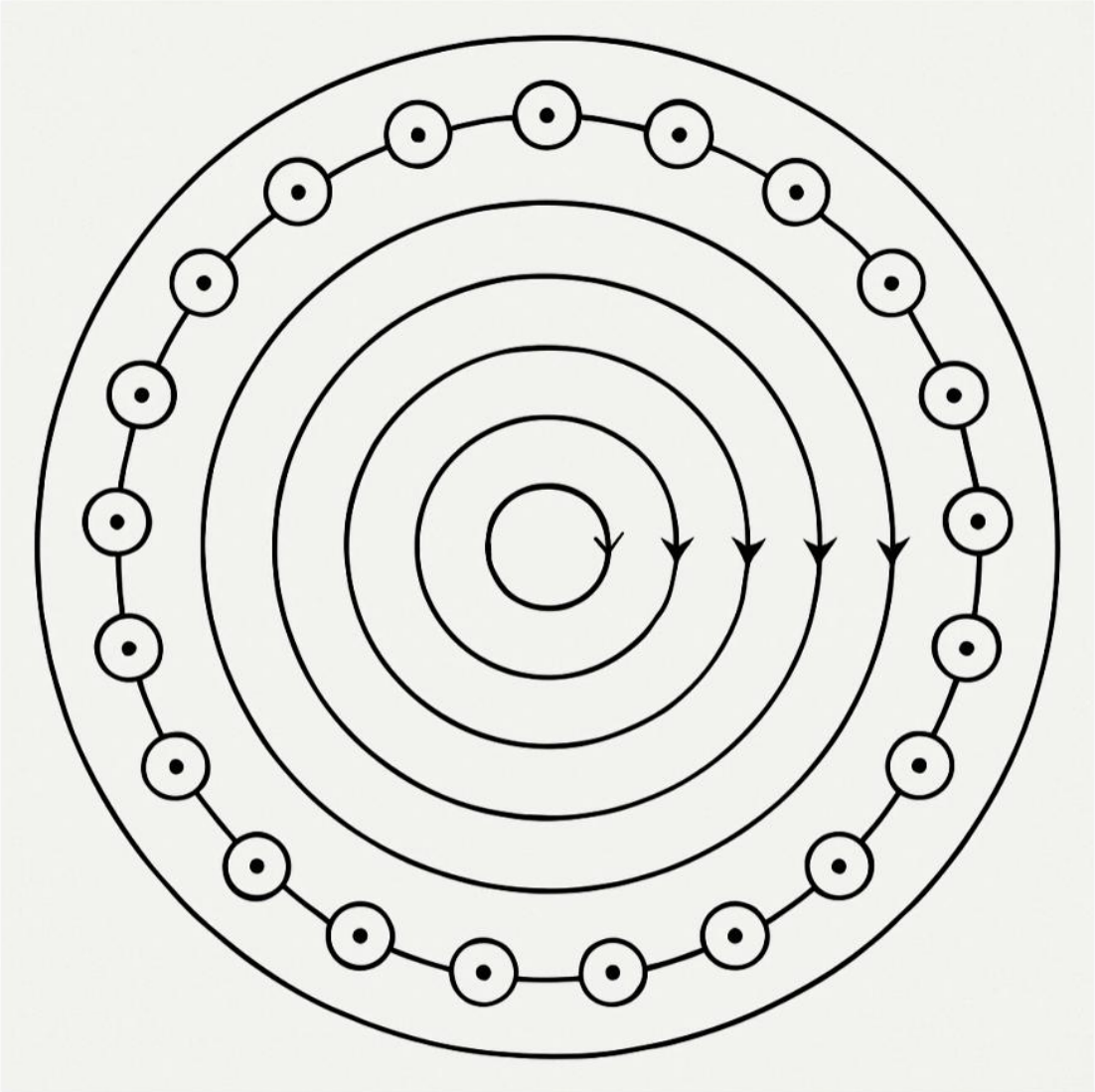
- **Actual Toroid:** The overall shape of the device.
- **Toroidal Magnetic Field ($\vec{B}_T$):** The magnetic field lines are confined within the torus, running parallel to the major circumference. This configuration is crucial for confining charged particles (e.g., plasma or electron beam).

2. Poloidal Magnetic Field Cross-Section (2D View)

This cross-section, taken perpendicular to the major circumference, details the current flow in the **Poloidal Field (PF) Coils** and the resulting **Poloidal Magnetic Field ($\vec{B}_P$)**.

This configuration is used to shape and position the plasma or particle beam.

The current flow in the coils is uniform in direction, which is a configuration that can be used to generate a vertical field component.



Key Features:

- **Outer Circles:** Represent the cross-section of the **Poloidal Field (PF) Coils**.
- **Dots (•):** Indicate current flowing **out** of the plane (towards the viewer) in all coils.
- **Inner Arrows:** Show the direction of the **Poloidal Magnetic Field ($\vec{B}_P$)** inside the chamber, following the right-hand rule. The field lines are concentric circles

around the current-carrying coils.

- **Central Area:** Represents the vacuum chamber or plasma confinement region.