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Toroidal Byzantine Chess

4-ring torus (4×16 circular board with radial wrap)	2
BOARD	PLAYERS

TOROIDAL BYZANTINE CHESS

Toroidal Byzantine Chess combines the historical **Byzantine Chess** board (four concentric rings of 16 squares each, 64 squares total) with **toroidal topology**: the innermost ring connects to the outermost ring radially. This creates a fully closed surface with no edges — a donut-shaped (torus) board in ring form.

Byzantine Chess itself descends from Shatranj (the form of chess that reached Europe from the Arabic world, differing from modern chess mainly in piece movement) and was played in Byzantium around 1000 CE on a circular board instead of a standard 8×8. Khalfine and Saperow built the toroidal version explicitly by analogy to the "Shape of Space" torus family documented on the same site (Karl Fischer's Torus Chess on a Standard Board and Alberto Monteiro's Chess in a Toroidal Board): join the edges of the circular Byzantine board the same way those variants join the edges of a square board, and a torus results, with the Byzantine piece rules unchanged. The source hedges on whether this exact combination was ever historically played ("perhaps… has been experienced in Constantinople"), but is confident about the modern formalisation: considered by several mathematicians, including the authors themselves, circa 1999–2001.

STARTING POSITION

The source states piece rules are "the same as in Byzantine Chess," but the **setup differs** from plain Byzantine Chess. In ordinary Byzantine Chess, each army straddles the seam where file p meets file a; on the toroidal board that arrangement would put both Kings in mutual check immediately (the radial wrap removes the inner/outer edges that normally shield them). Instead, each army is placed in a contiguous 4-file block, positioned so that **only pawns are attacked** from the starting position.

Using the rectangular "unrolled" development of the ring board (4 rings as ranks 1–4, 16 positions as files a–p — the same convention as plain Byzantine Chess), confirmed against the source's interactive diagram:

White (files c–f):

- Rank 1: Rook (d1), Rook (e1); Pawns (c1, f1)
- Rank 2: Knight (d2), Knight (e2); Pawns (c2, f2)
- Rank 3: Bishop (d3), Bishop (e3); Pawns (c3, f3)
- Rank 4: King (d4), Queen (e4); Pawns (c4, f4)

Black (files k–n — the same pattern shifted 8 files around the ring):

- Rank 1: Rook (l1), Rook (m1); Pawns (k1, n1)
- Rank 2: Knight (l2), Knight (m2); Pawns (k2, n2)
- Rank 3: Bishop (l3), Bishop (m3); Pawns (k3, n3)
- Rank 4: King (l4), Queen (m4); Pawns (k4, n4)

Files a, b, g, h, i, j, o, p are empty at setup. The `engine.setup` FEN encodes this ring-by-ring, highest ring (4, outermost) first down to ring 1 (innermost) — the same rank-descending convention used by every other FEN in this hub (e.g. rank 8 first on a standard board) — run-length style: digits are empty-square counts, uppercase is White, lowercase is Black.

BYZANTINE CHESS FOUNDATION

Piece movement follows Byzantine Chess (Shatranj-era rules), per the source's direct link to that page:

PIECE	SHATRANJ NAME	MOVEMENT
King	Shah	1 step in any direction
Queen	Fers	1 step diagonally
Bishop	Fil	Leaps exactly 2 diagonally
Rook	Rukh	Slides orthogonally
Knight	Faras	Leaps as in modern chess
Pawn	Baidak	Moves 1 step radially toward opponent

In standard Byzantine Chess, pieces travel around the rings continuously: ring position 16 connects to position 1 on the same ring.

Note: the source's own overview text loosely refers to a modern circular-board reconstruction of Byzantine Chess as "Circular Chess." This is almost certainly generic phrasing, not a claim that it is the same product as the separately-documented, unrelated "Circular Chess" already in this hub (David Reynolds, 1983, FIDE pieces, no ring-radial structure) — the two should not be conflated, but it's worth knowing the name collision exists in source material.

TOROIDAL ADDITION

In Toroidal Byzantine Chess, the **radial edges** also wrap:

- A piece sliding inward from ring 4 (the innermost ring) emerges from ring 1 (the outermost ring) at the same angular position
- A piece sliding outward from ring 1 emerges from ring 4 at the same angular position
- Diagonal movement that crosses the radial boundary does so with the corresponding offset

This means there are truly no edges on the board — every ring is adjacent to two rings on both radial sides (ring 1 is adjacent to rings 2 and 4; ring 4 is adjacent to rings 3 and 1).

CONSEQUENCES FOR PIECES

Rooks: the source confirms a Rook on the toroidal board can travel either the long 16-cell circle (around a ring) or the short 4-cell circle (radially, in and out through the wrap) — it "feels itself quite well everywhere," unlike on the plain circular Byzantine board where radial movement is restricted at the inner and outer edges.

Bishops (Fil): the 2-step diagonal leap behaves normally within the ring structure; at the radial seam, the leap continues to the appropriate ring.

Queen (Fers): one step diagonally, as in Byzantine Chess — the toroidal wrap does not extend the Fers's range since it only ever moves one square.

King: has up to 8 neighbours in all positions (no corner or edge restrictions).

PAWNS

Pawns (Baidak) move radially "toward the opponent," one step at a time. In the toroidal version, the radial wrap means a Pawn advancing past ring 4 would emerge from ring 1 rather than being blocked — though given the contiguous starting blocks above, in practice most pawns will contact enemy pieces well before reaching that wrap.

WIN CONDITION

Checkmate the opponent's Shah (King). Shatranj rules may also apply: stalemate = win; bare King = win (unless opponent can bare King on the next move, in which case it is a draw).

ATTRIBUTION

Toroidal Byzantine Chess invented by Anatoly Khalfine and Ernst Saperow, circa 1999–2001. Source: chessvariants.org/shape.dir/toroidalbyzantinechess.html, including its overview text and interactive setup diagram. Byzantine Chess foundation: chessvariants.com/historic.dir/byzantine.html.