Recall that gluing two tetrahedra in a certain way produces the complement of the figure 8 knot (§)

Let the two tetrahedra be regular ideal tetrahedra.

Recall the Poincaré disk model.

In 3D, consider a sphere of radius 4.

Interior models hyperbolic space.

Ideal tetrahedron has vertices on boundary.

Ideal tetrahedra can be considered as tetrahedra w/ vertices deleted.

The dihedral angles of a regular ideal tetrahedron measure $60^\circ$.

If 6 (neg/ideal) tetrahedra are glued along an edge, $\Sigma$ dihedral angles is $360^\circ$.

Thurston claims this shows regular ideal tetrahedra tile hyperbolic space.
This gives a geometric structure on the regular ideal tetrahedra; induces geometric structure on Fig. 8 knot complement: because in this gluing, 6 tetrahedra are glued along an edge.

From Adams, Hildebrand, Weeks:
Volume (complement of Fig. 8 knot) = 2.02988321...
This is 2 x vol (regular ideal tetrahedron)

The Whitehead link

Goal: the complement of the Whitehead link is homeomorphic to an octahedron with a certain gluing of its faces.

decorate with arrows & fill in regions

2 kinds of faces; 4 faces total, for 8 sides
Shrink knot; get triangles

Do this for all 8 regions:

This is an octahedron!

Glue according to forcing arrows to match up; get #s 1, 2, 3, 4 above

Make this a regular ideal octahedron:
Dihedral angles are 90°

Reg. ideal octahedra tile hyperbolic space, 4 around an edge
in gluing pattern, 4 octahedra come together at each edge. We have geometric structure on the complement of the white head link.

From AHW: volume = \(3.66386237\ldots\)

Borromean rings:

Goal: Complement is a hyperbolic manifold formed by gluing two octahedra in a certain way.
and on other side:

... of edges to make colors match up, faces pick up rotations:

Make two octahedra into regular ideal octahedra; 4 meet at each edge; so there is a geometric structure on the complement.

The volume is \( 7.32772475 \ldots \) of the complement of the Borromean rings.