



IMAGING X-RAY POLARIMETRY EXPLORER

1/16th Scale Detailed Model



Thousands of light-years away, supermassive black holes heat up nearby gases so hot that they emit X-rays. X-rays are a powerful, high-energy form of light. Astronomers want to study their “polarization”—the direction they’re vibrating—to better understand extreme objects such as black holes. Ball Aerospace engineers designed the IXPE spacecraft for this job.

IXPE carries three telescopes with cameras that need to be 4 meters (13 feet) away from the X-ray detectors, which are on board the spacecraft. This makes for a long spacecraft! To fit inside a launch rocket, engineers designed an origami boom that stays folded and compact until IXPE is released into space. Then the boom unfolds and twists away from the spacecraft.

Try your hand at making this detailed model, which has a boom that can be stowed or deployed.

IXPE’s launch on a SpaceX rocket is slated for December 2021. For more details:

[IXPE: Home \(nasa.gov\)](https://www.nasa.gov/ixpe)

[Ball Aerospace - IXPE](#)

(See the video of boom testing!)

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Instructions

You'll find it easiest to work on one page at a time.

1. Score the parts that have fold lines, then cut them out.
2. Fold those parts along the fold lines.
3. Cut out the remaining parts, then assemble all parts by matching the numbers.
4. Checkfit each part before gluing, matching alignment as needed.
5. Assemble using minimal glue; wipe off excess glue.

Tools Needed

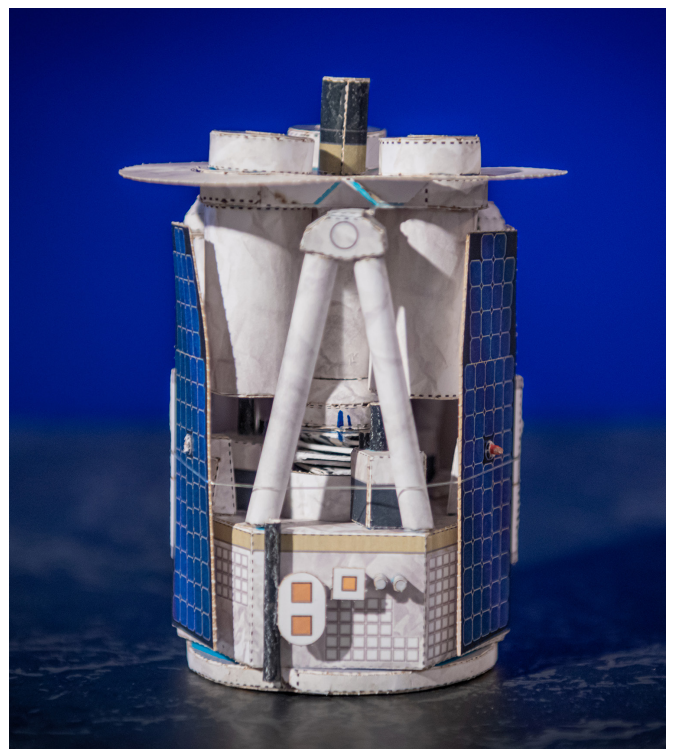
- Small scissors (for cutting all curved lines)
- Hobby knife with a new blade (required for cylinders)
- Scriber, ball-point pen, small knitting needle or large, smooth sewing needle (for scoring folds)
- Ruler
- Cutting board, if using a hobby knife (tagboard or cardboard is OK)
- Dowel or round pencil; table edge is OK (for forming curved parts)
- Rubber or foam pad (for forming curved parts)
- Tweezers (for holding and bending small parts)
- White glue
- Toothpicks (for glue application and "stowed" option)

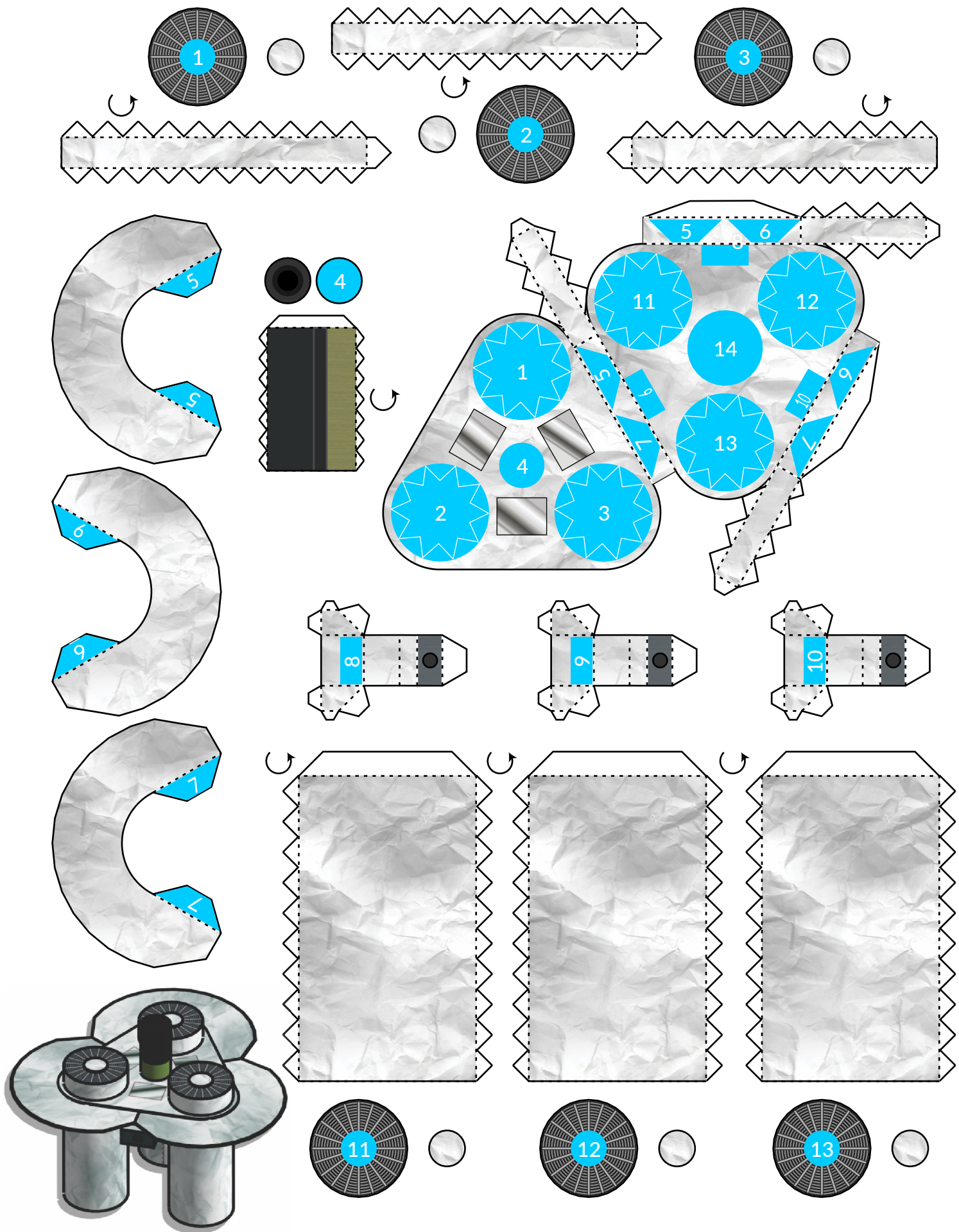
Forming Parts

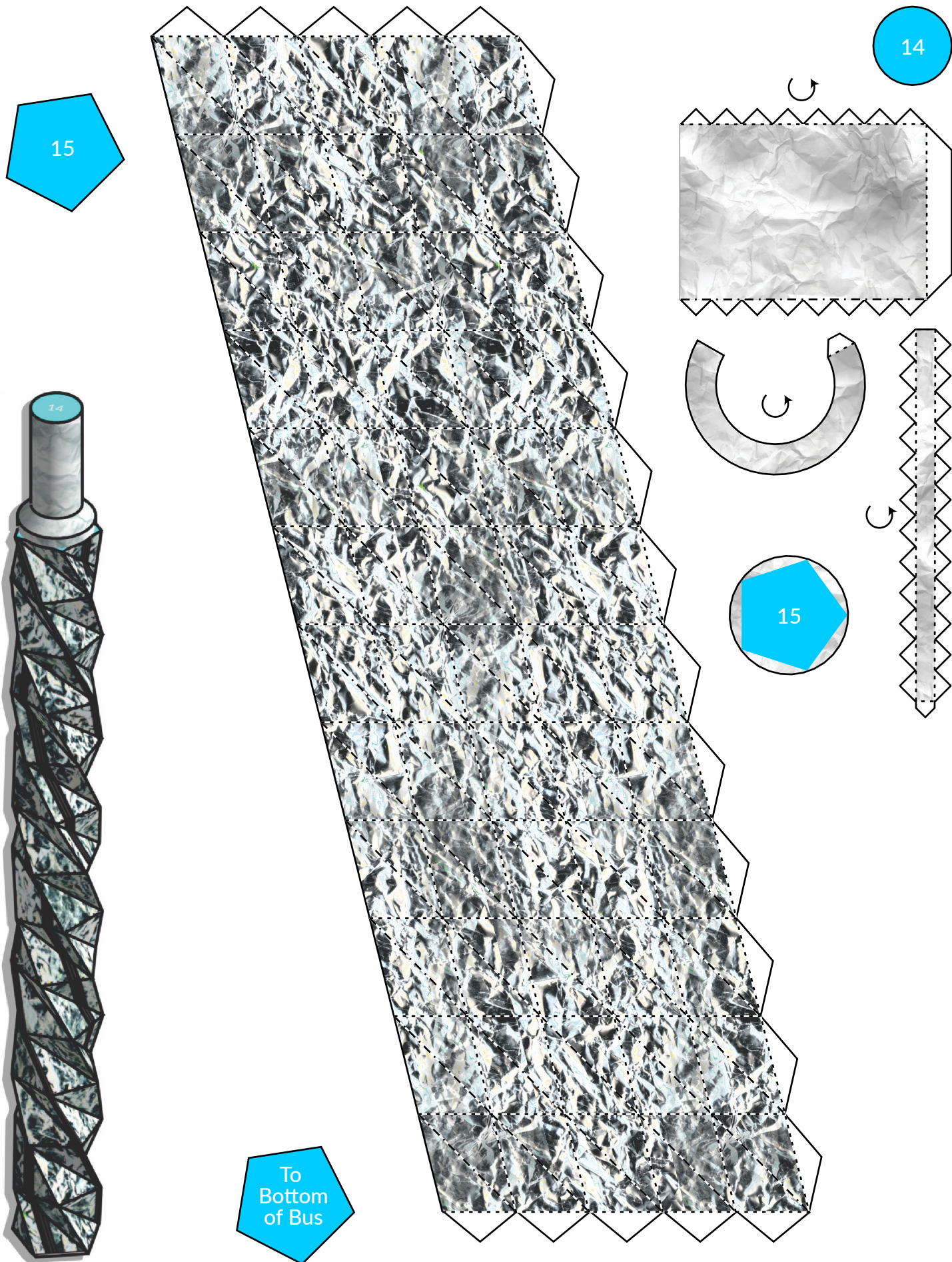
- **Scoring** slightly weakens the paper so you can make perfect folds. Use a ruler and scribe or other round-tipped tool to firmly draw along fold lines.
- To form a **cylinder**, roll the part between a dowel or round pencil and a foam pad; repeat as needed. Before gluing, check for a good fit.
- Use **glue** very sparingly, because too much results in warping and excessive drying times. Use a toothpick with a small puddle of glue on scrap paper. Don't try to glue too much at a time on any part. Glue only four or five tabs at a time, and let them dry before moving on.

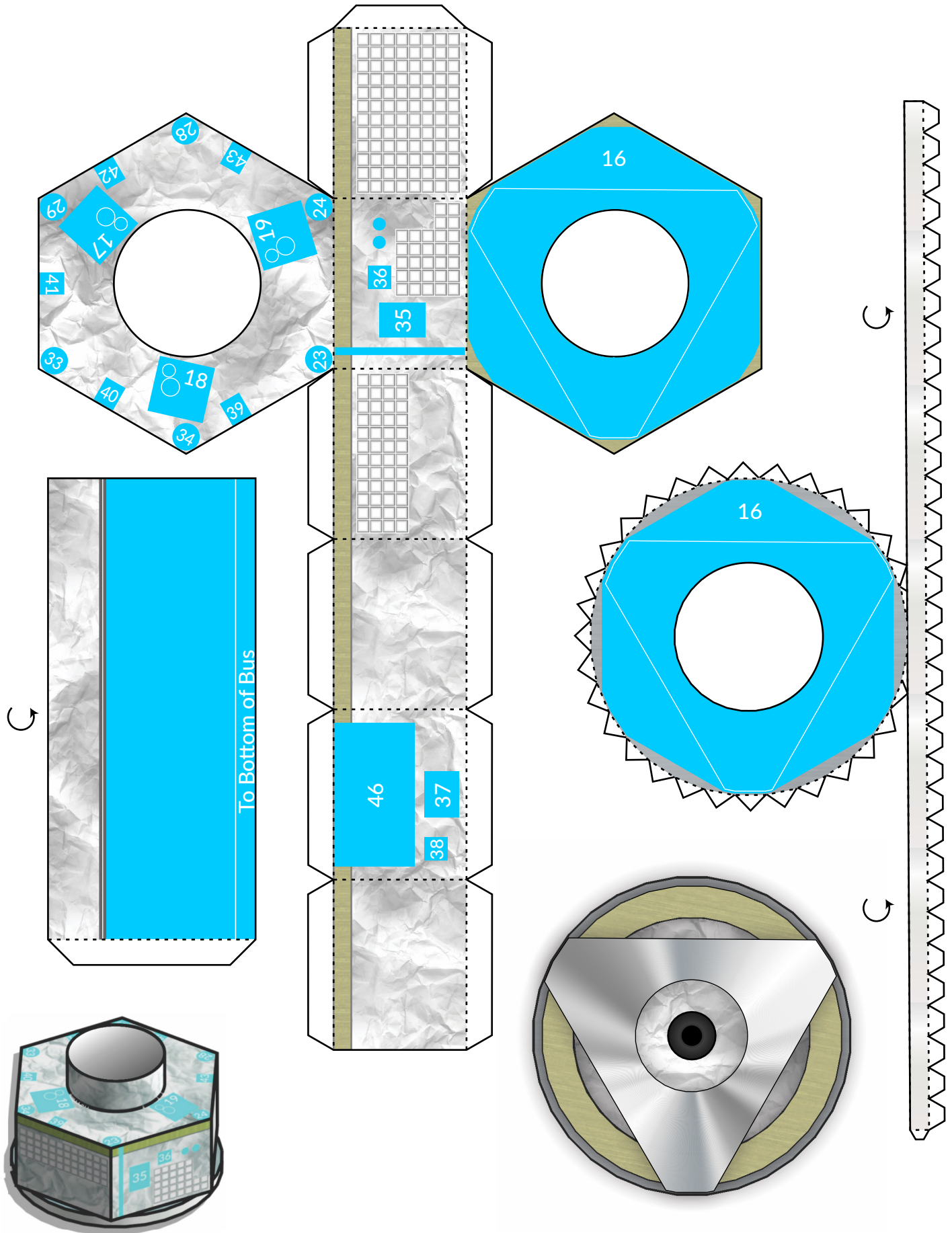
Line Key

- = Cut Lines
- = Mountain Fold Score Lines
- - - - - = Valley Fold Score Lines
- ↻ = Roll into a tube









Polarization Sensitive Detectors, Bipods, Torque Rod, and Antennas

