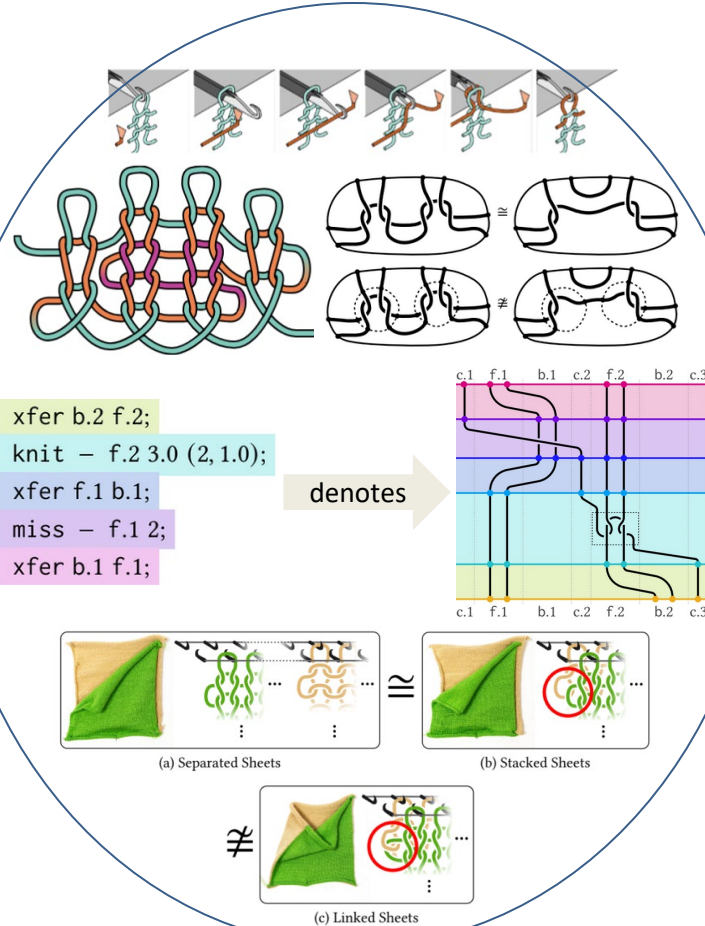# Knitting Semantics

Challenge:

- Software stacks for compiling knitting machine programs are a "Blast from the Past"

- The semantics of a manufacturing program is the object it produces, not a function it computes.

Solution:

- Knitting programs denote the "tangles" they produce; we characterize *topological equivalence* of programs

- Develop a new knitting software stack w/ formal guarantees: sound & expressive

```
xfer b.2 f.2;
knit – f.2 3.0 (2, 1.0);
xfer f.1 b.1;
miss – f.1 2;
xfer b.1 f.1;
```

denotes

(a) Separated Sheets

(b) Stacked Sheets

(c) Linked Sheets

Scientific Impact:

- Designing new, efficient algorithms for deciding knit program equivalence

- Advance manufacturing programs as a subject of study within PL, especially for fabric

- Develop manufacturing program optimization methods

Broader Impact and Broader Participation:

- As the only fully automatic whole garment manufacturing method: key to advanced manufacturing & sustainability

- Increased support for home knitting & hobbyist machines

- 100 person workshop at SIGGRAPH