Unifying Layered Parallelism on the Cell BE

- Managing layered parallelism
  - Host processor (PPE) serves as front-end
    - Work distribution
    - Communication with the outside world
  - Need balance of computation supply and demand
    - PPE, SPEs, intra-SPE (SIMD), inter-SPE, inter-PPE

- Contributions
  - Event-driven, split-task scheduling framework
    - Unified user-kernel scheduler for PPE/SPE tasks
    - Dynamic space-sharing
  - MMGP
    - Hierarchical model of layered parallelism
    - Optimal layered program decomposition and scheduling
  - Ongoing work: compiler automation

- Results (see papers at PPoPP’07, IPDPS’07, HiPEAC’08, Parallel Computing)
  - 2.7x over Linux+MPI+SDK on BladeCenter, PS3
  - Modeling error < 0.05 across four layers of parallelism

PBPI results

![Graph showing execution time vs. number of SPEs for different MPI processes]