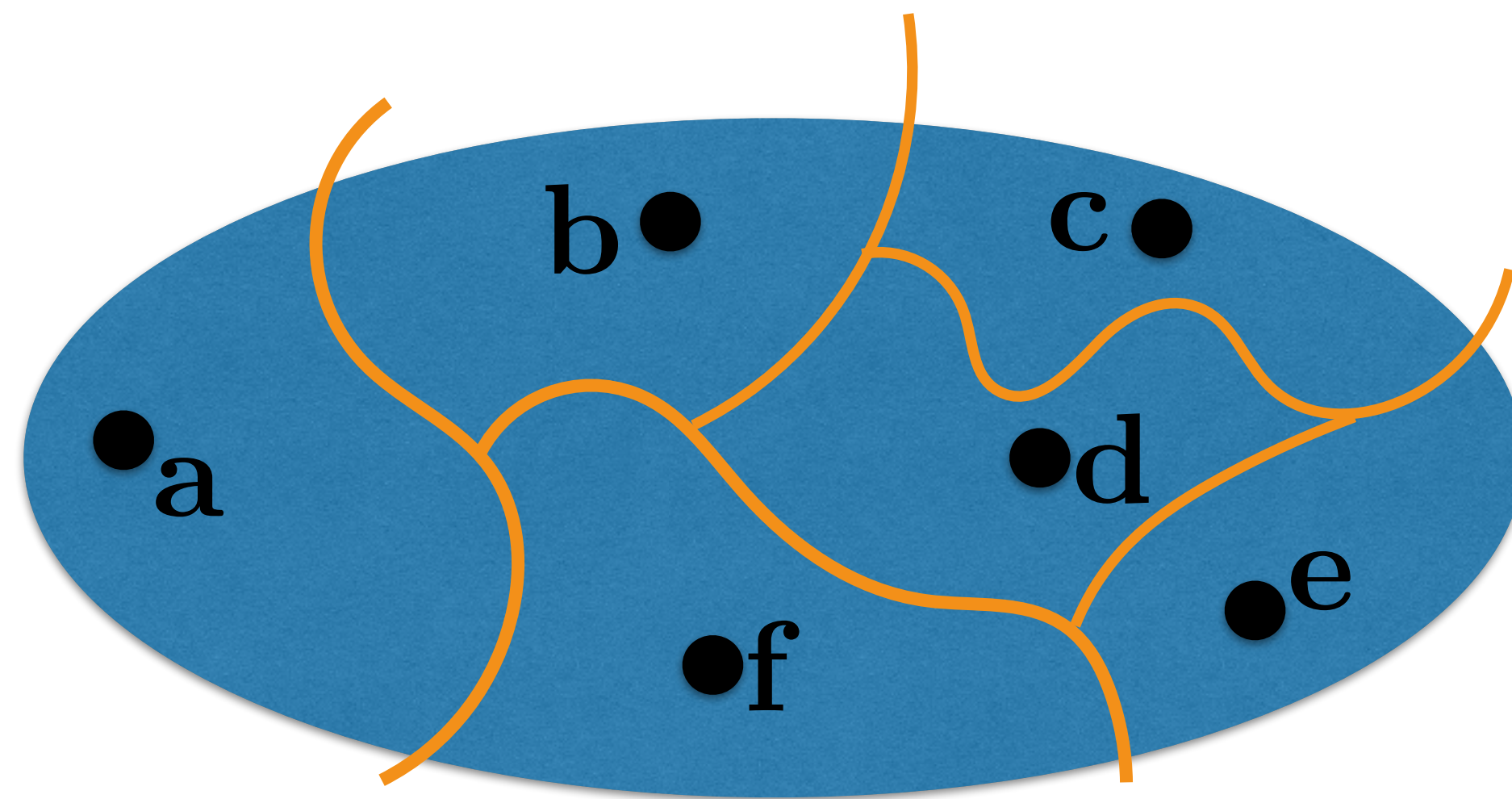
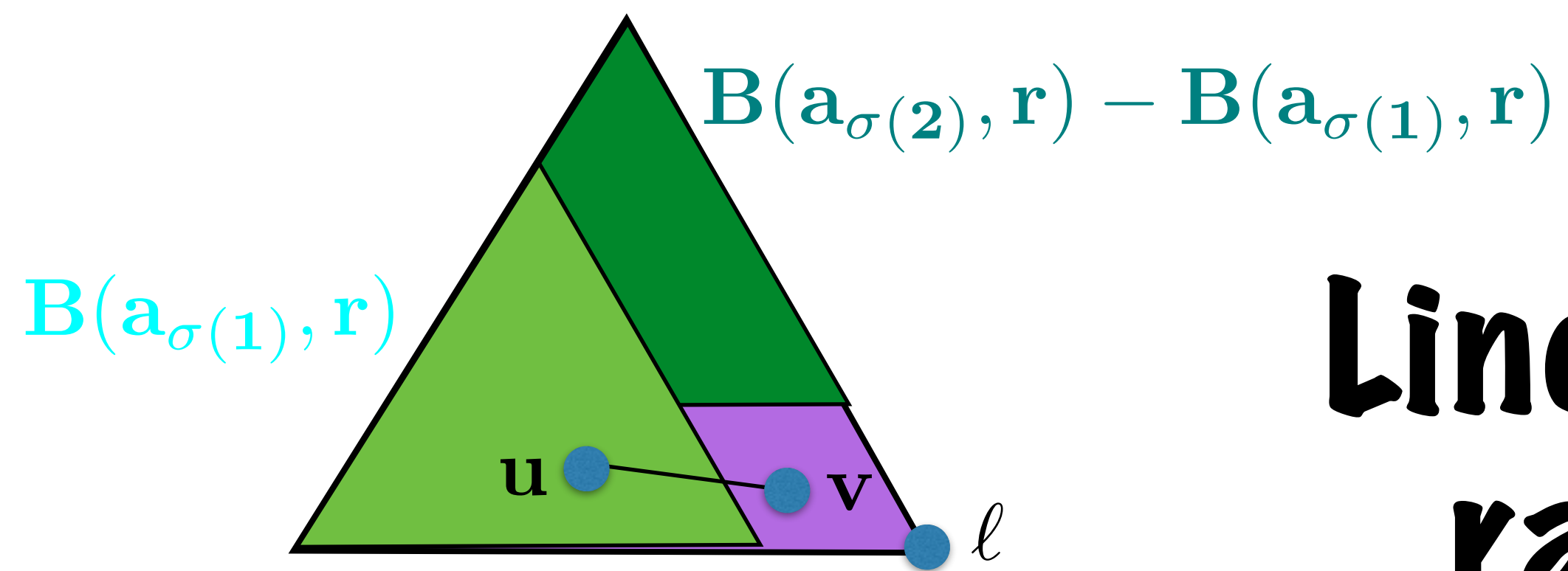


Multiway cut, linear programming and randomized rounding





**Linear programming and
randomized rounding
give a $3/2 - 1/k$
approximation
for multicut**

Can we do better?

$k=3: 1\ 2/1\ 1$

by using LP to find the rounding!

APX-hard: cannot get $1 + \epsilon$

The story behind the story

Applications:

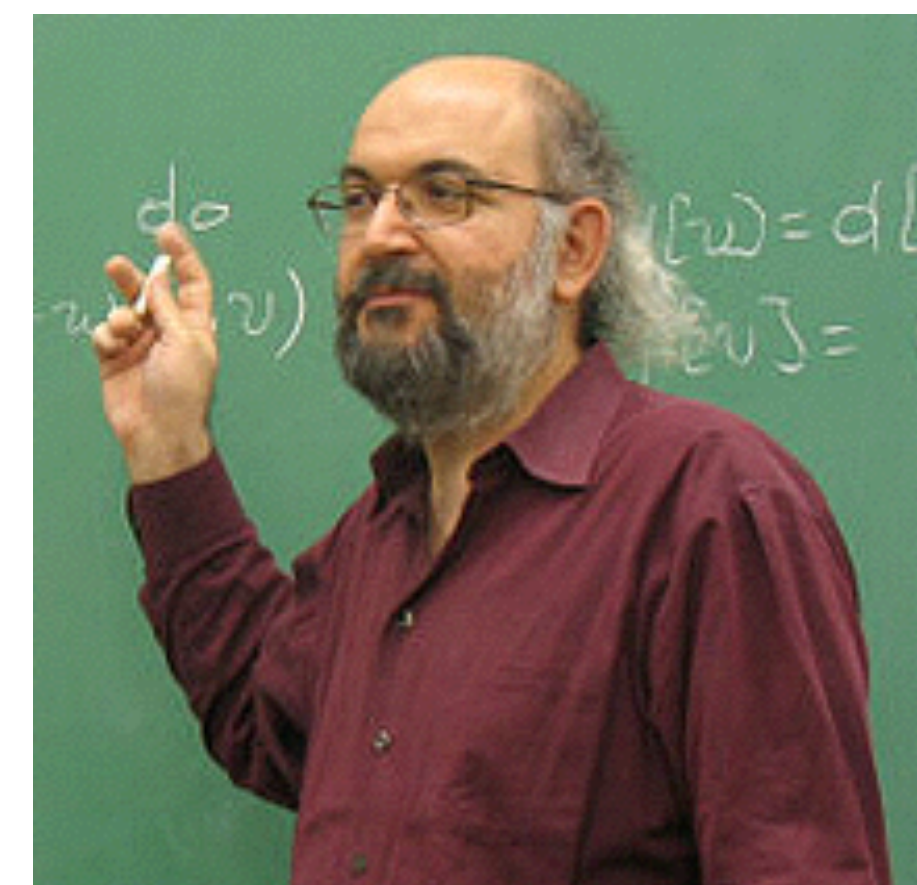
- “minimization of communication costs in parallel computing systems...
- assigning program modules to processors ...
- partitioning files among the nodes of a network...
- assigning users to base computers in a multicomputer environment...
- partitioning the elements of a circuit into the subcircuits that will go on different chips”



Elias Dalhaus



David Johnson



**Mihalis
Yannakakis**



Christos Papadimitriou



Paul Seymour

**APX hardness
approx with min cuts**



Gruia Calinescu



Howard Karloff



Yuval Rabani

Geometric embedding

$$3/2 - 1/k$$



David Karger



Philip Klein



Mikkel Thorup



Cliff Stein



Neal Young

**12/11
rounding by
linear programming**

Techniques

- rounding input
- linear programming relaxation
- randomized rounding
- probabilistic analysis techniques
- geometric interpretation

Problems

- Vertex cover
- Knapsack
- Bin packing
- Set cover
- Multiway cut

Approximation algorithms, Part II

LP duality

primal dual algorithms

semi-definite programming

Multiway cut, linear programming and randomized rounding

