RPI JAVA Applets

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NSF Educational Objectives

• Semester-long teaching modules were developed for undergraduate Kinetics of Materials (25 modules) and graduate-level Diffusion in Solids (24 modules).

•To enhance the subject material covered in these courses and provide students with additional learning experiences, we developed Java applets that amplify particularly important and difficult concepts.

•Sources on the Internet were searched for available Java programs developed by others, and original applets were developed under NSF support.

•An example of the former is the British web development *Matter* project *http:www.matter.org.uk* that offers CD's for sale containing some interesting examples with applicable content for kinetics and solidification.

NSF Educational Objectives

• The authors created and small computer programs, Java applets, that run compatibly with the developed computer-projected modules.

• New Java applets are conceptualized with and then built by undergraduates students from RPI's computer science department.

•This effort is partially supported by NSF to provide demonstrative and interactive experiences within these subjects for engineering students.

• The students using the new applets must provide data requested in the applets, obtain a result, and then judge the result based on formal instruction received in class and through text sources.

• These applets also serve as an additional test used by instructors to ascertain the comprehension and skill level achieved by the students.

RPI Web site for accessing modules

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Additional Links:

Professor Glicksman's Home Page
Professor Lupulescu's Index Page

Kinetic Modules and additional presentations

Kinetic Documents

- Read Me
- Syllabus

Kinetic Modules

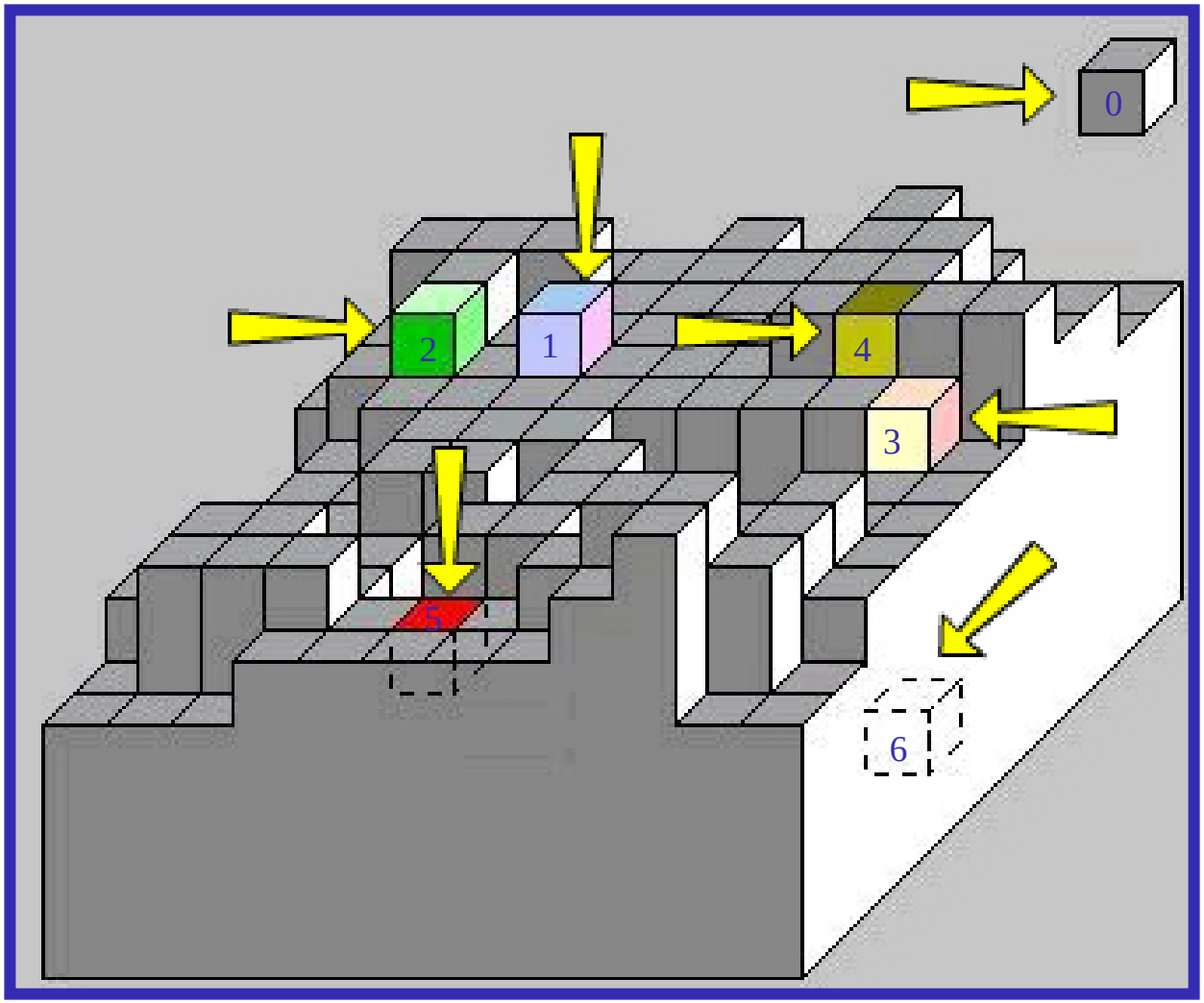
- Module 1: Introduction
- Module 2: Phase Transitions details
  Download the complete module
- Module 3: Diffusion in Infinite Systems details
  Download the complete module
- Module 4: Solution to Diffusion Equation
- Module 5: Diffusion Induced Phase Change details
  Download the complete module
- Module 6: Diffusion Mechanisms
- Module 7: Diffusion Around Precipitates
- Module 8: Vacancy-Assisted Diffusion
- Module 9: Diffusion-Reaction
- Module 10: Substitutional Diffusion details
  Download the complete module
- Module 11: Interfaces details
  Download the complete module
- Module 12: Grain Boundaries
- Module 13

  1. Module 13: Grain Growth in 2d and 3d Part A details
  2. Module 13: Grain Growth in 2d and 3d Part B details
     Download the complete module

- Module 14: Boundaries and Interfaces
- Module 15: Solid-State Interfaces
- Module 16: Solid-State Nucl. and Precipitation
- Module 17: S-L Interfaces details
  Download the complete module

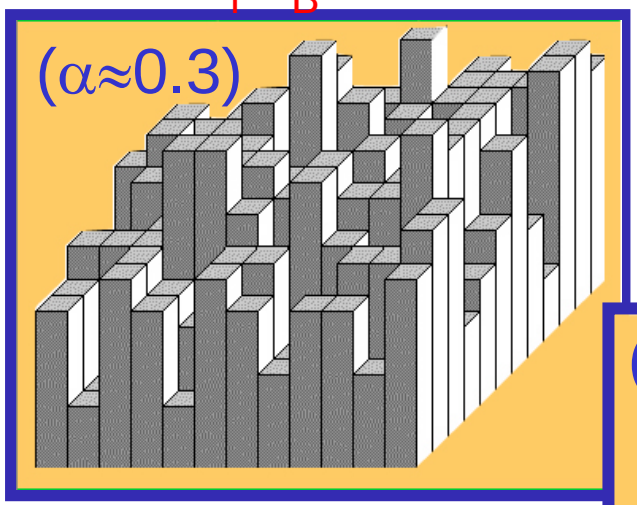
Not Availiable
Author n/a
ISBN:
Month 2xxx
Available via: Link to Publishers

Interface Positions: Bond Count

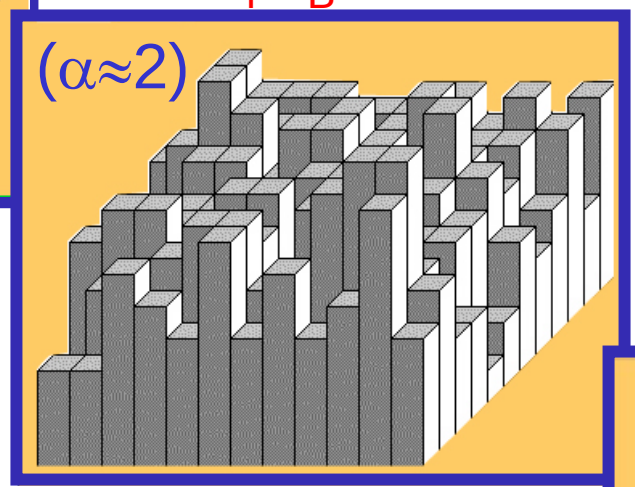


Interface Structures: Boltzmann Probability

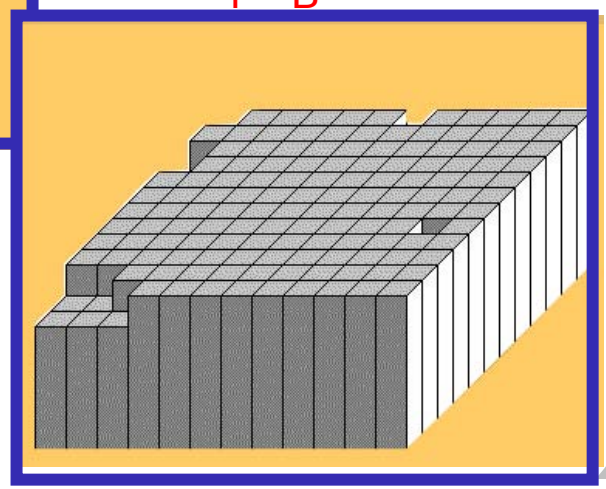
$\Delta S_f/k_B=0.5$



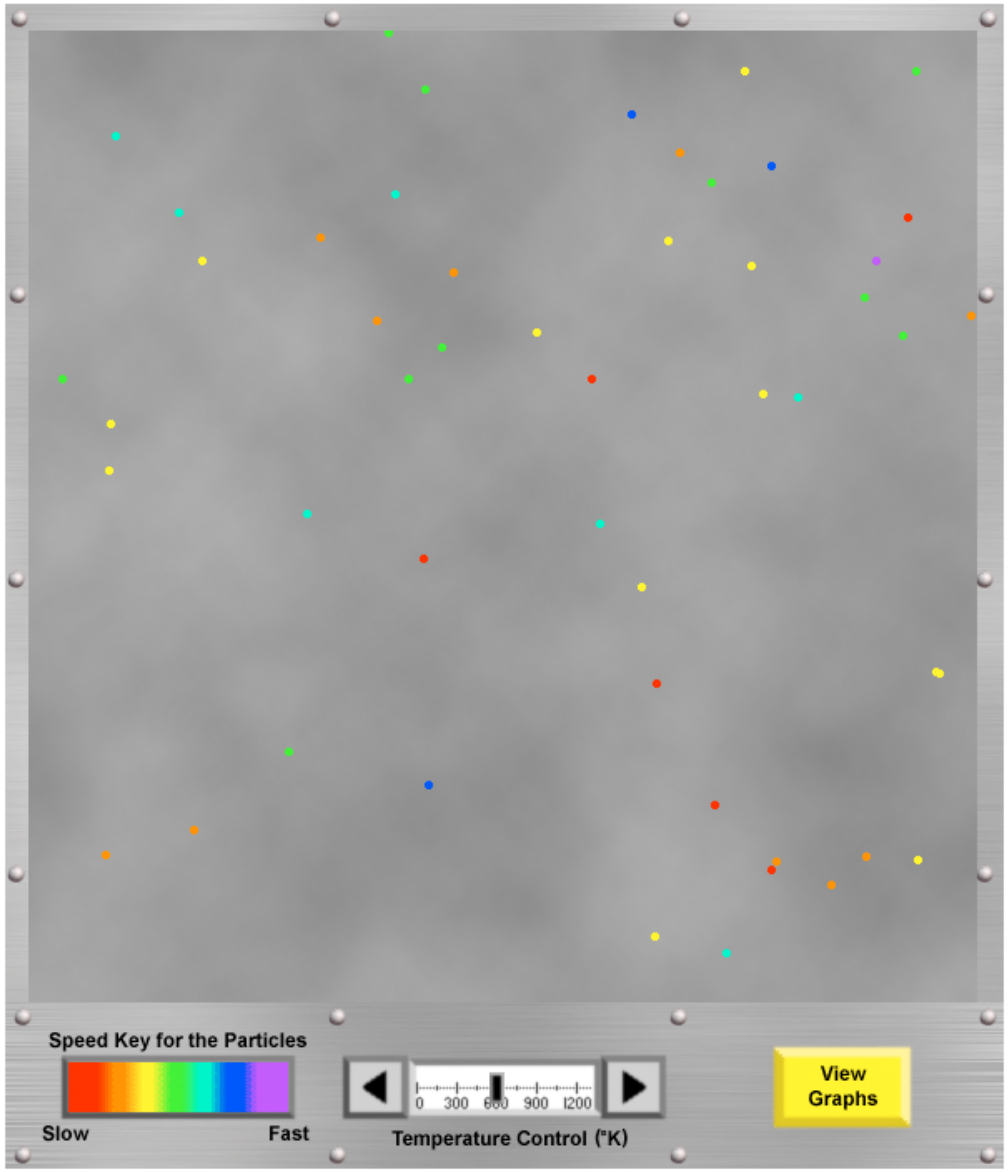
$\Delta S_f/k_B=3$



$\Delta S_f/k_B=10$

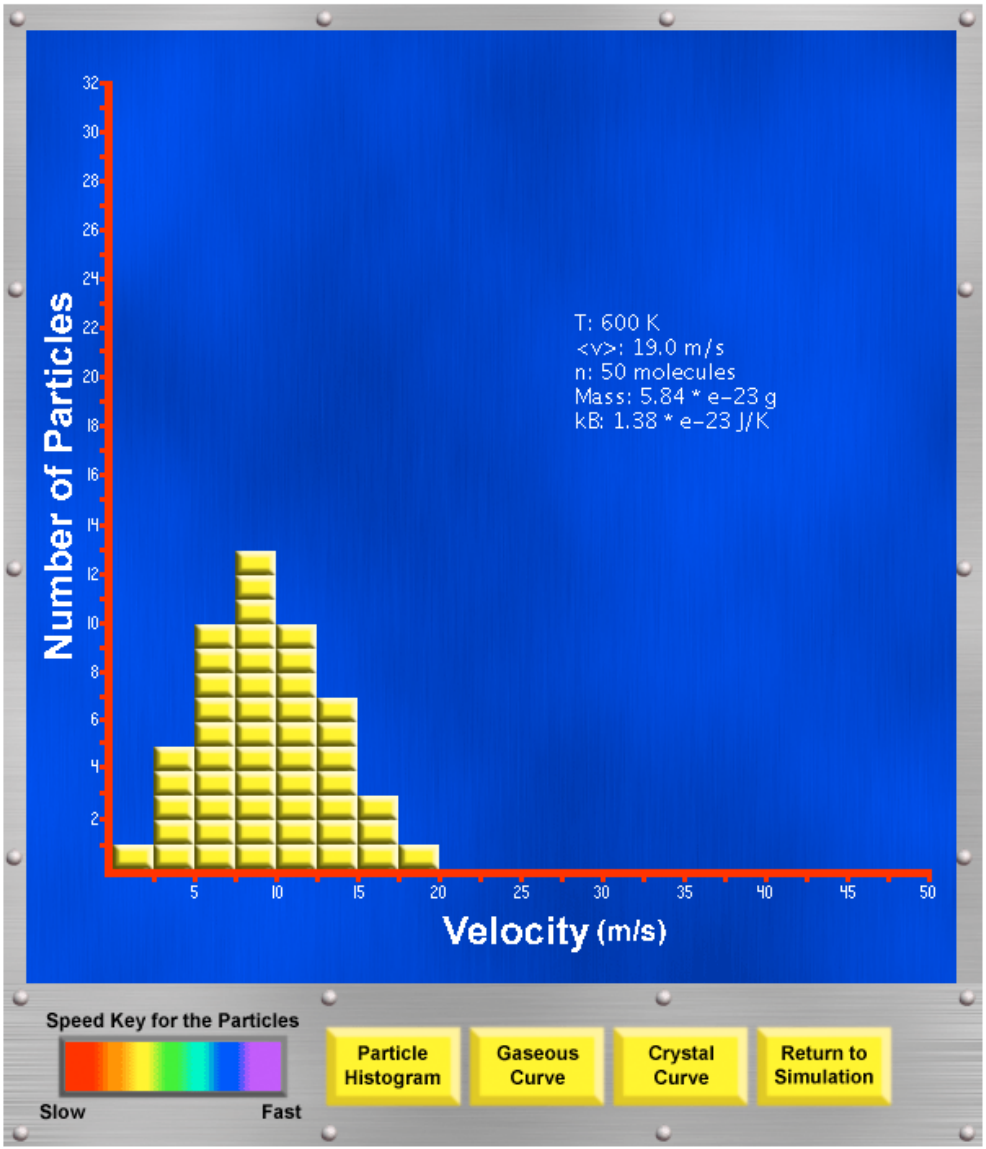


Maxwell-Boltzmann Applet



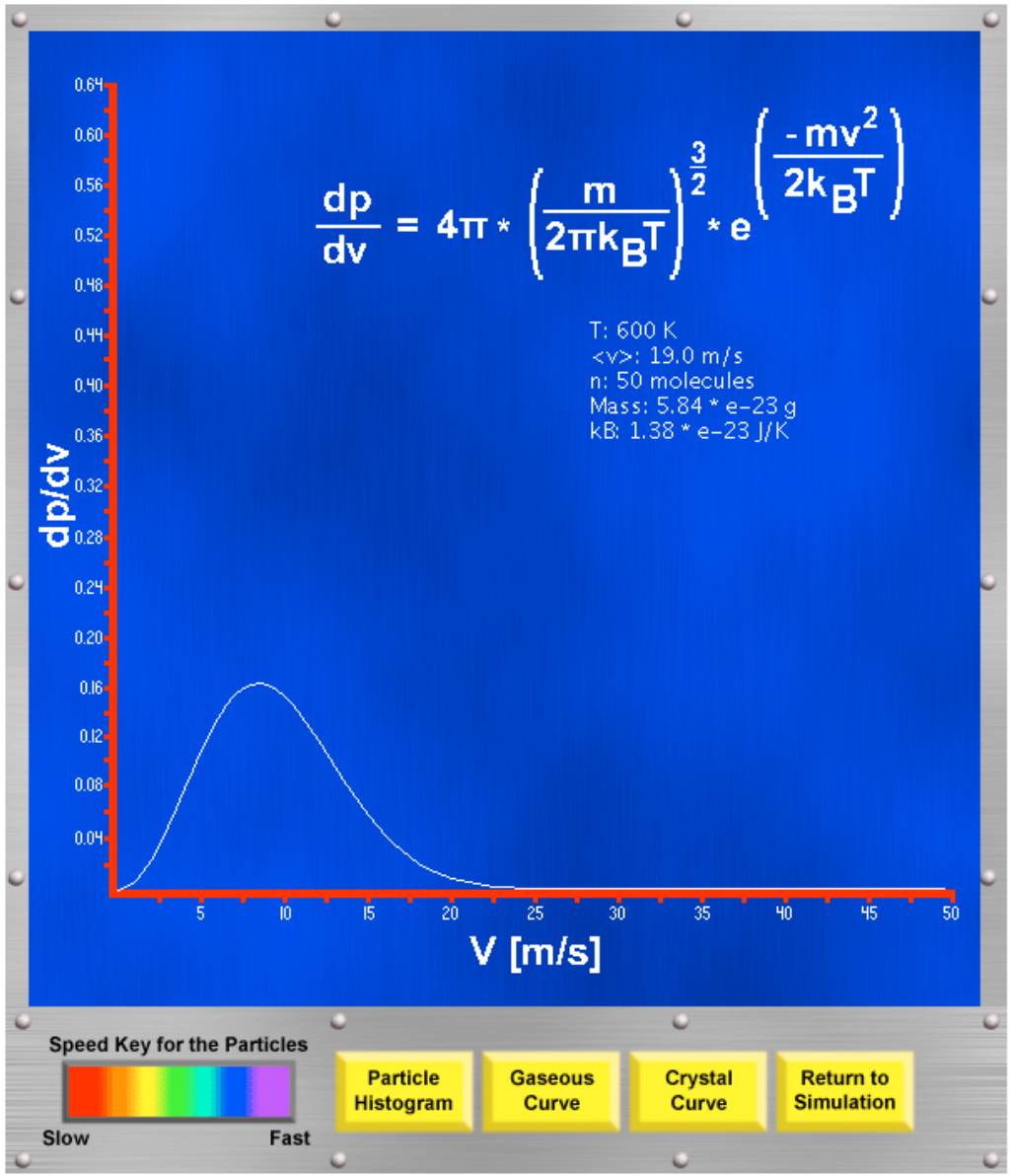
Original Applet

Maxwell-Boltzmann Applet



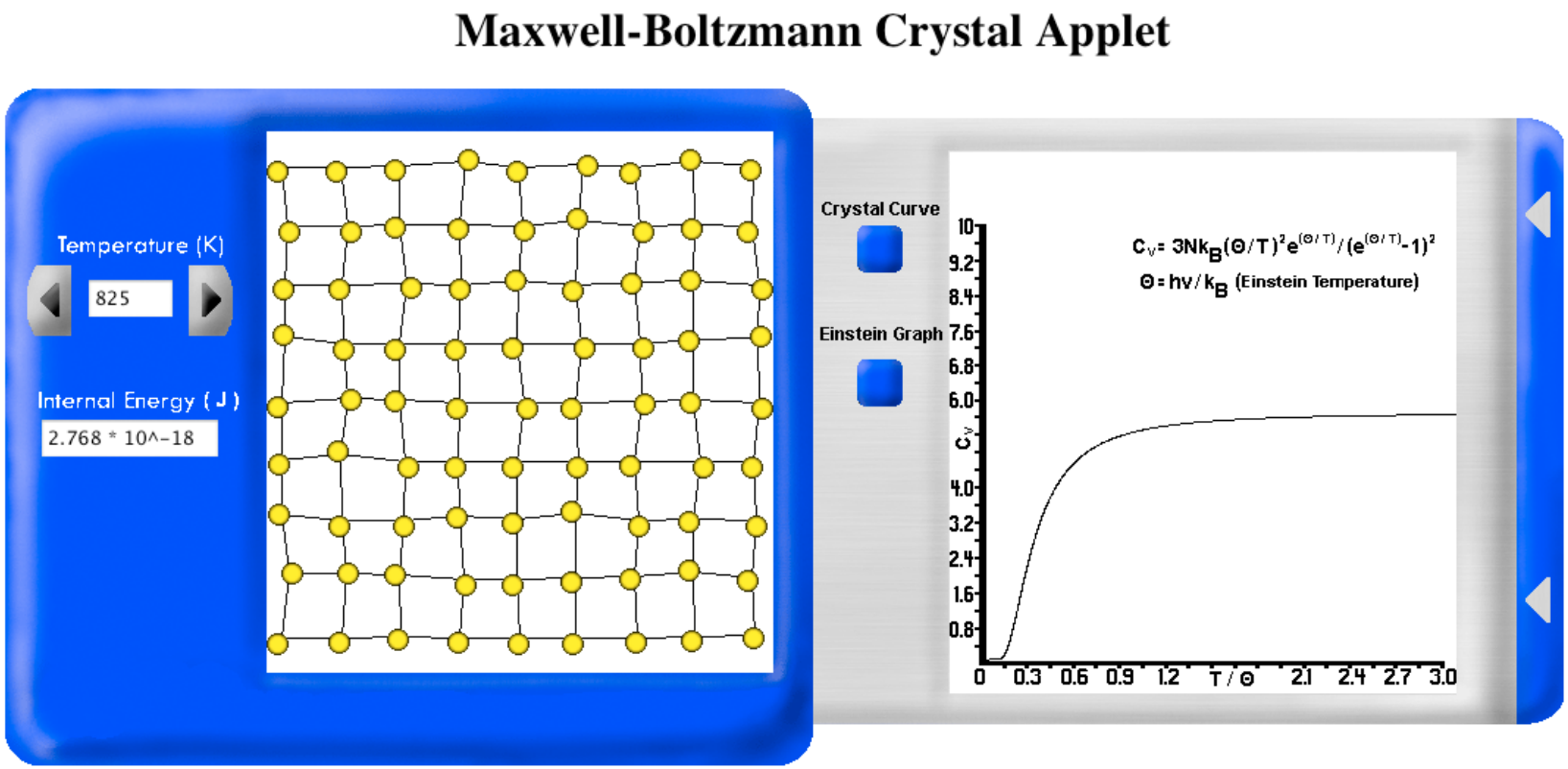
Original Applet

Maxwell-Boltzmann Applet

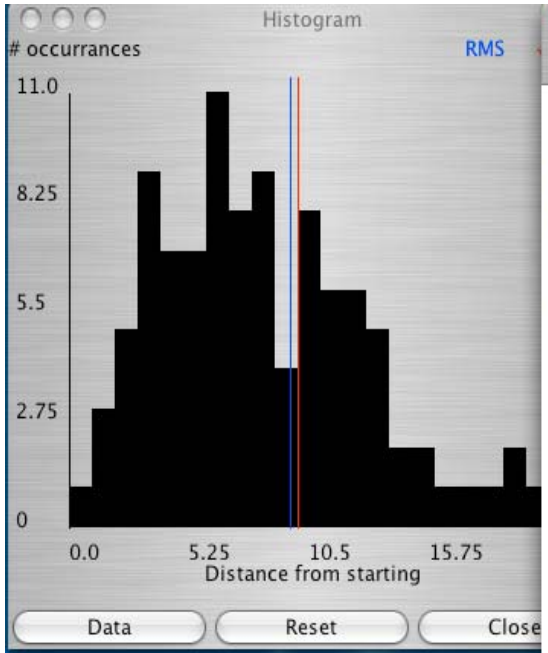


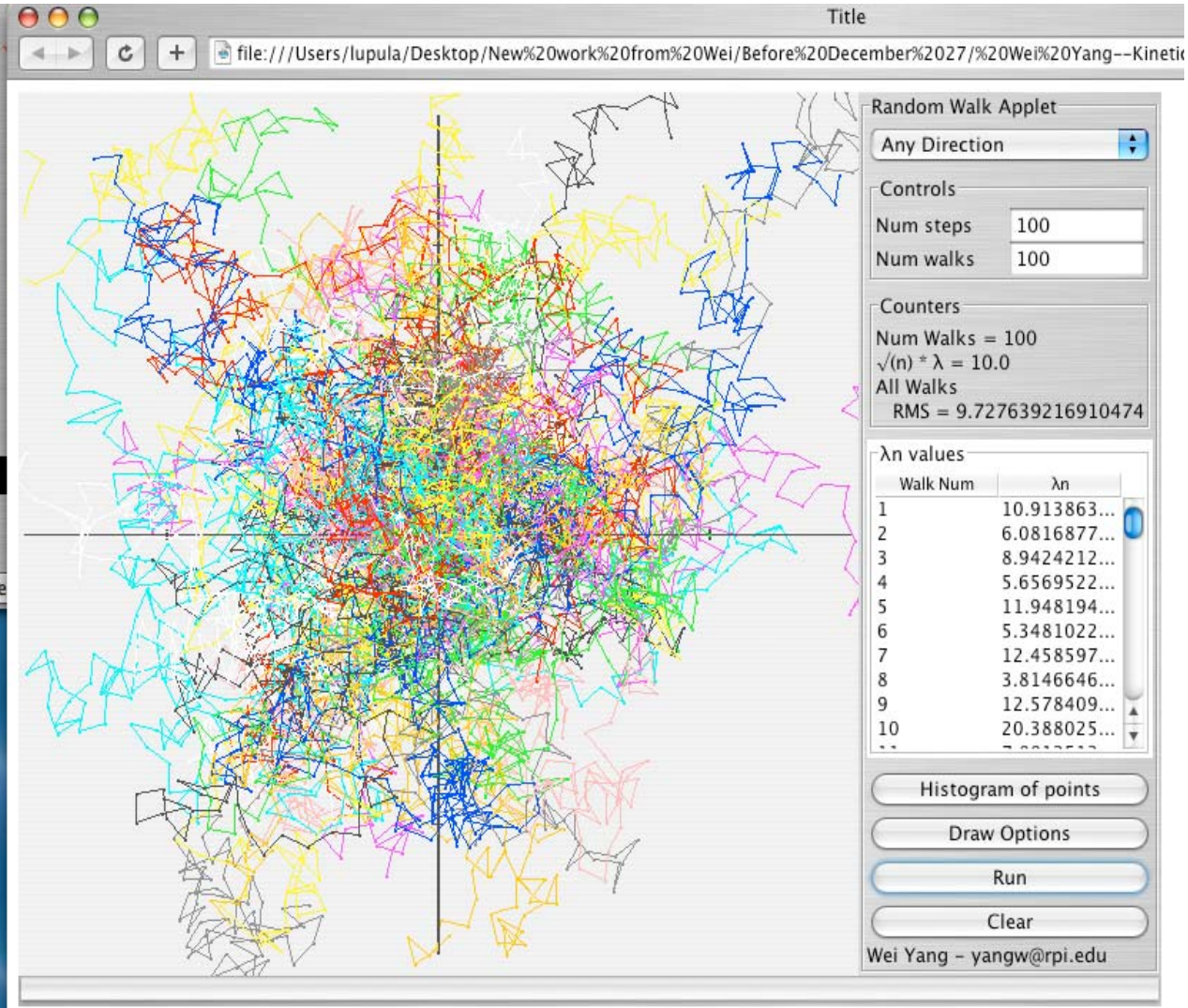
Original Applet

Original Applet

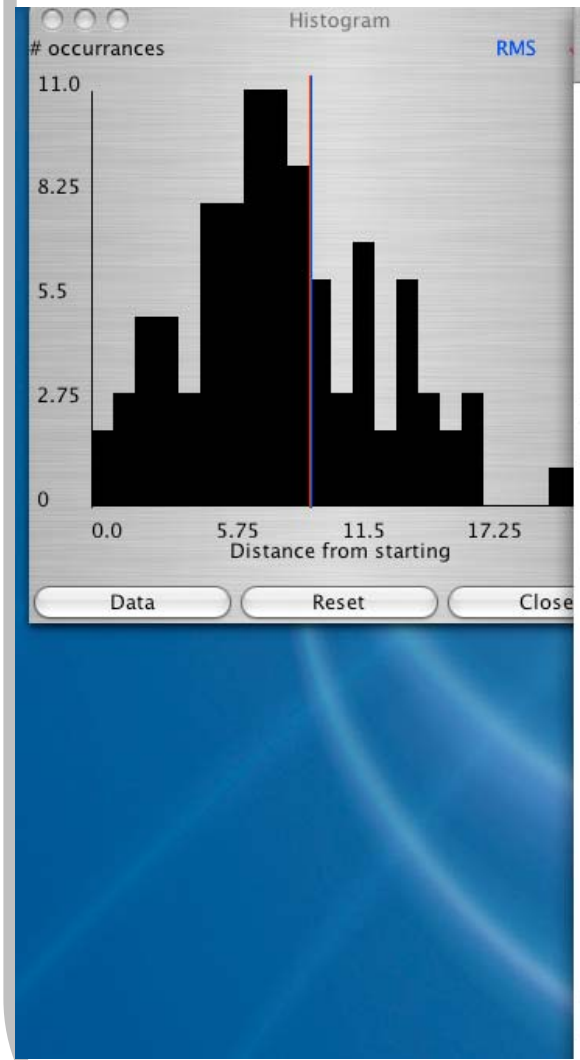


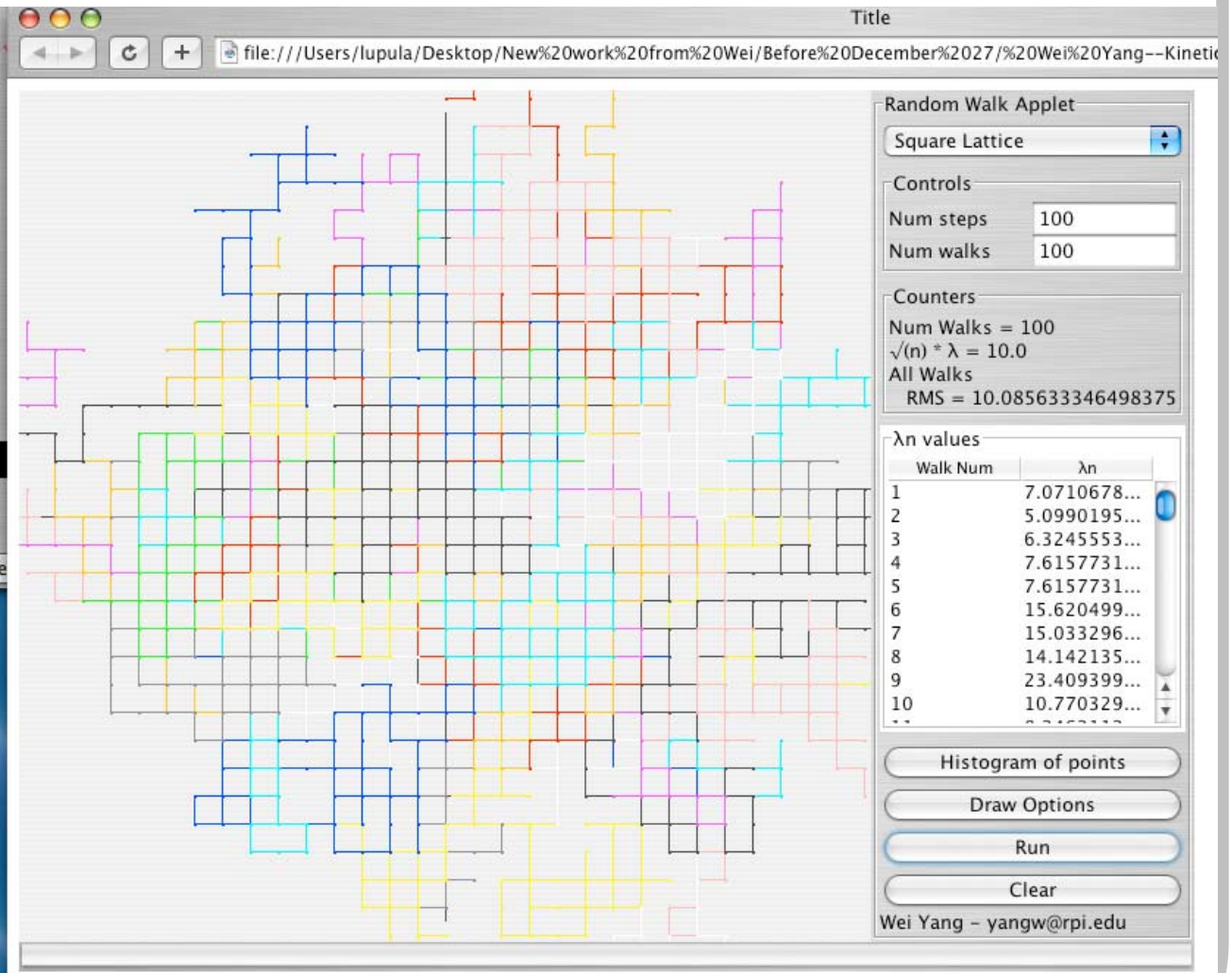
Original Applet: Random Walk



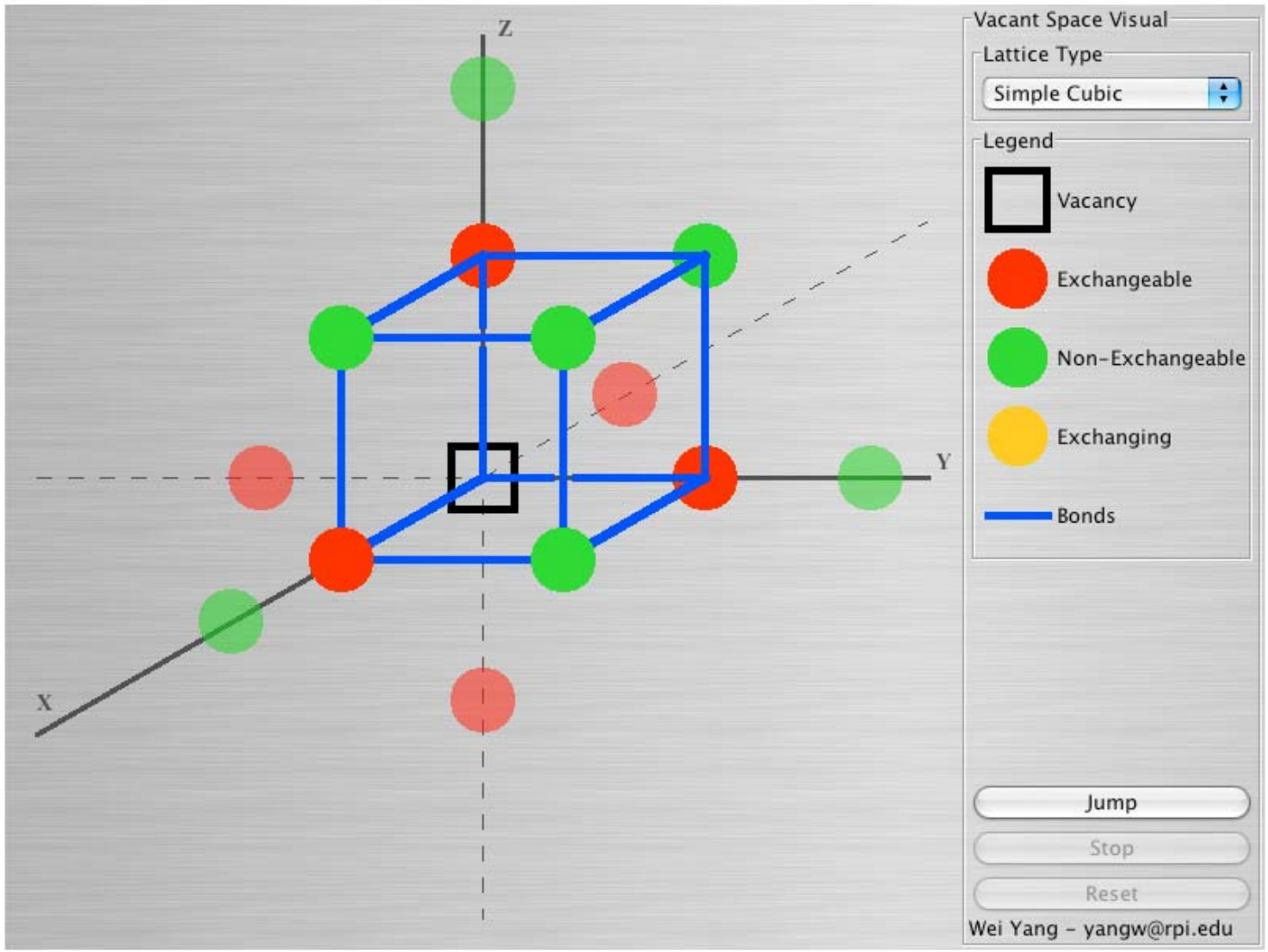


Original Applet: Random Walk

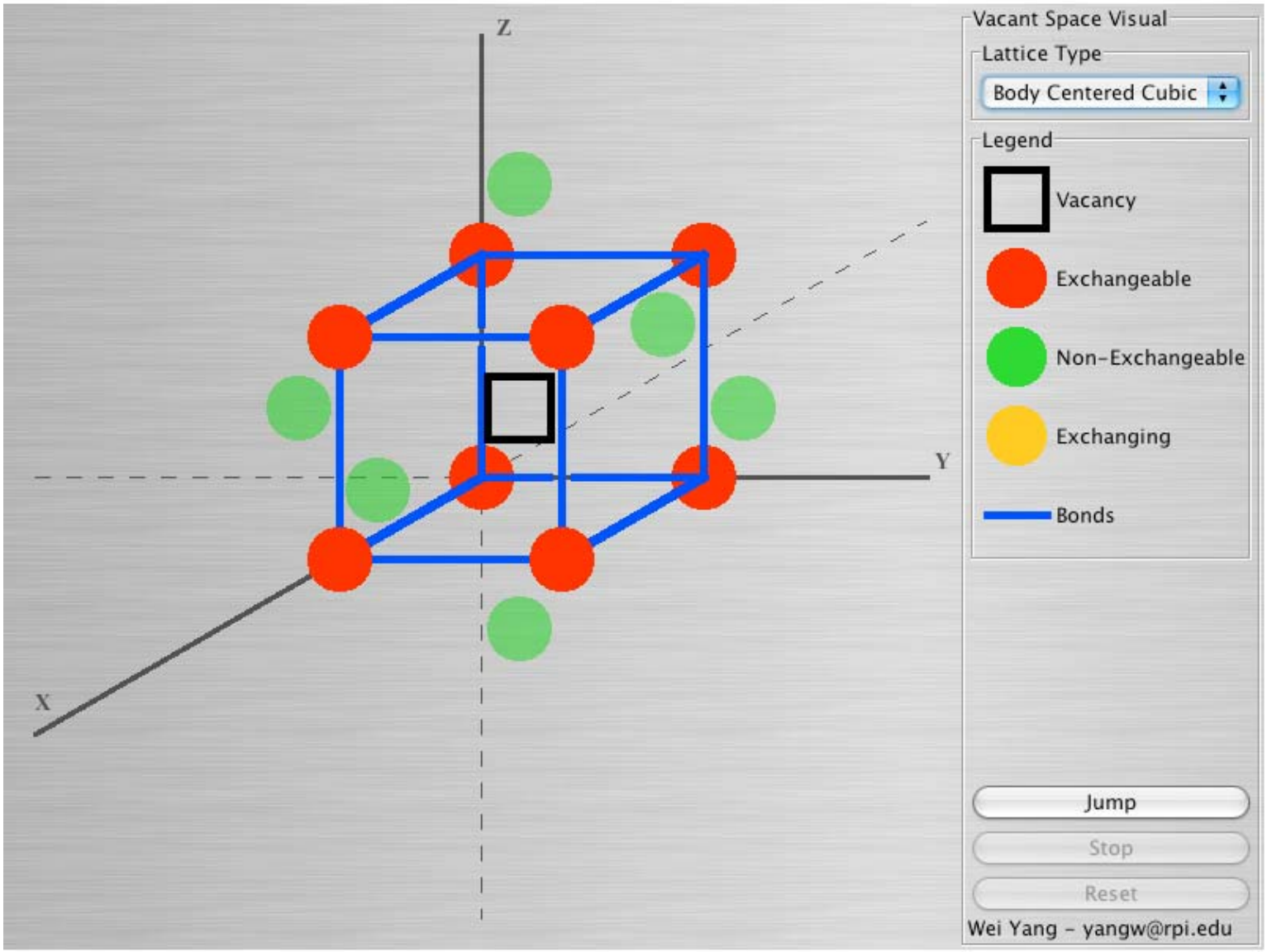




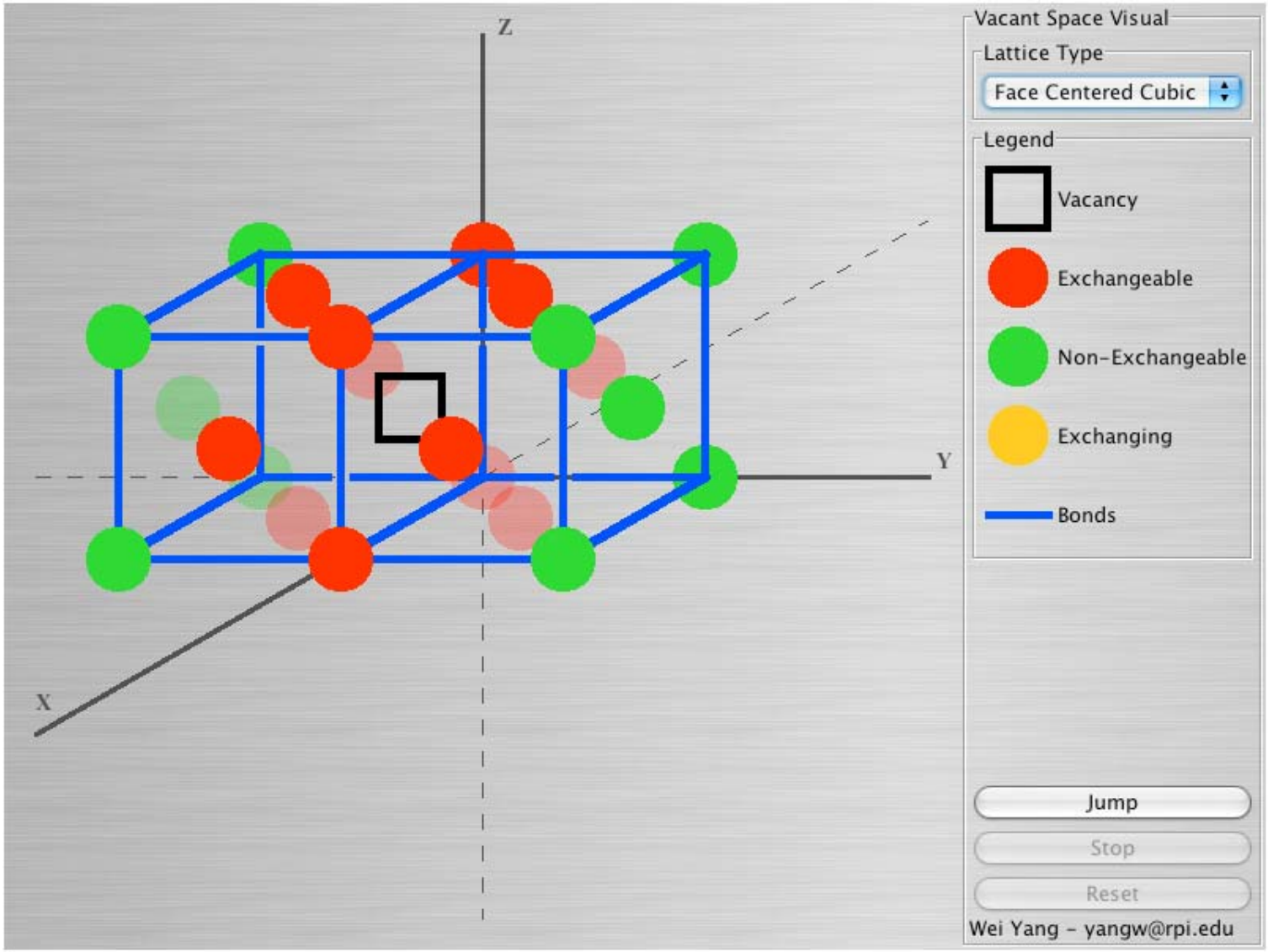
Orginal Applet: Vacancies in SC



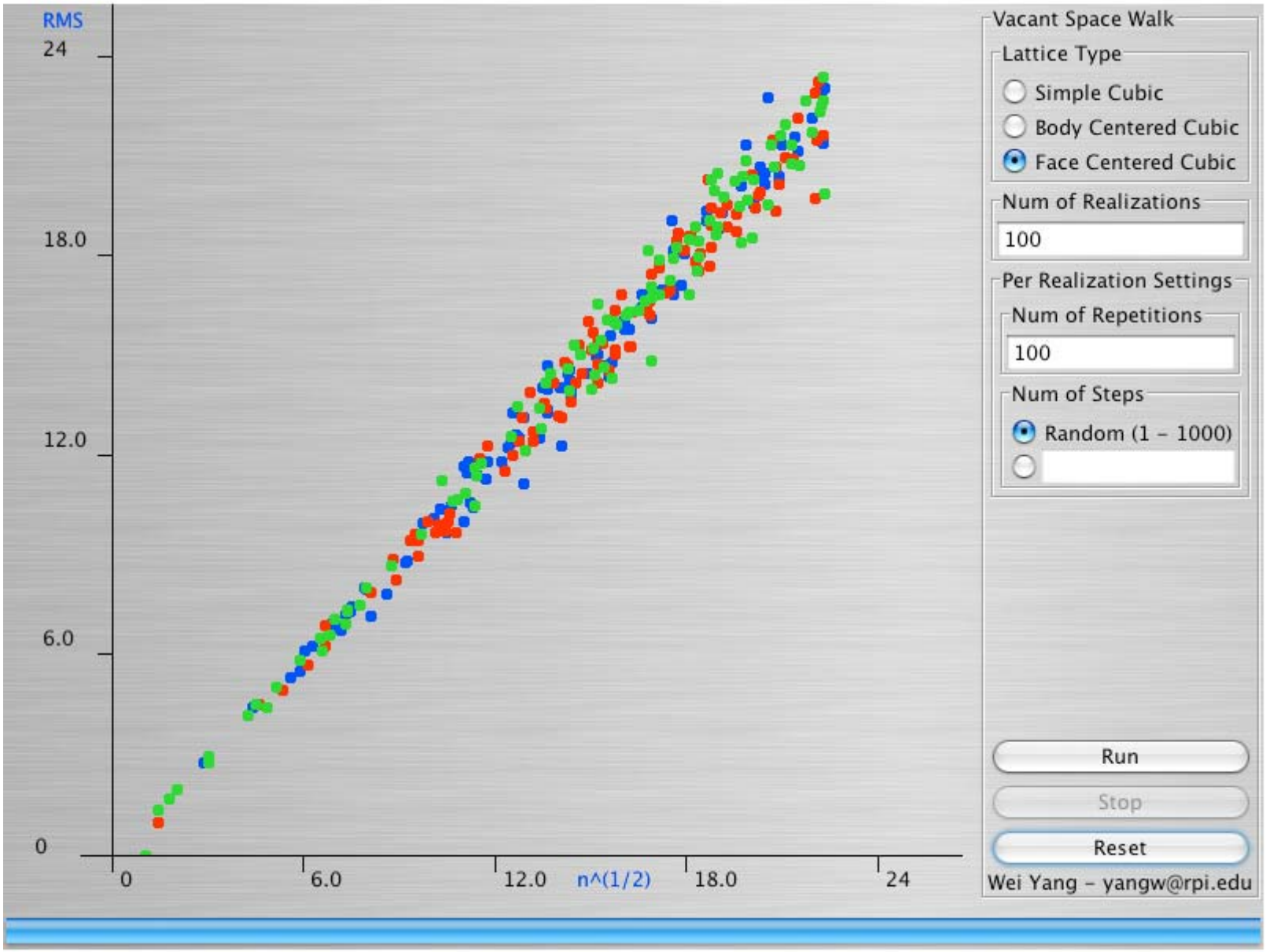
Original Applet: Vacancies in BCC



Orginal Applet: Vacancies in FCC



Original Applet: Random Walk



Summary

- Java Applets are well received by students.
- They help students visualize kinetic concepts.
- Java Applets are interactive, and revealing.
- They permit students to experiment with the program by exploring the influence of selectable parameters.
- They reduce the calculational burden and lower the “frustration” level for difficult subjects in diffusion and kinetics.
- They allow students to produce their own data and then judge the results.
- They easily integrate into the developing course modules.