

## 11/2/2006 Announcements

- Class Offering in 20062
  - 1051-217, *Fundamentals of Astronomical Imaging Systems*
    - ▶ MWF, 11-11:50
    - ▶ Dr. Joel Kastner
- Quiz #4 on TUESDAY, 11/7
- Final Papers due THURSDAY, 11/9
- FINAL EXAM: 11/15/2006, W
  - 2:45PM – 4:45PM, 08-1300

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## Reminder

- I am leaving for Baltimore before noon on FRIDAY 11/10
- Your final exam will be administered by a staff person (to be named) and shipped to me
- Your final paper **MUST BE** handed in on Thursday, 11/9

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## Rough Draft

- is supposed to be just that, ROUGH, but have the germ of the final paper in it
- Revision/Editing are parts of writing in every profession
  - (perhaps the MOST IMPORTANT parts)
- Should not let a document leave your desk without getting advice and without proofreading
- Paper requires you to practice this skill, which is essential in any professional career

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## First Drafts of Papers

- Assess Breadth of Your Topic
  - if too broad, then 8 pages is not enough
- **Proofread!!!**
  - Don't use "you" ("who, me?")
  - antecedents of pronouns must be obvious! ("it" refers to whom?)
  - match case ("they is")
- **Organization** is important
  - suggest using Headings:
    - ▶ Introduction
    - ▶ History
    - ▶ Advantages of System, ...
- References (NOT Wikipedia)
- USE DIAGRAMS (often best to make your own)
- Captions for Figures

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## Revision vs. Edit vs. Proofread

- Revision includes:
  - Assess breadth of topic (may be required if paper is too long)
  - Subject headings
- Editing includes:
  - expression ("English")
    - ▶ concise prose, odd pronoun references, sentence structure
- Proofreading means:
  - Read CLOSELY for spelling, grammar
    - ▶ (cannot rely upon spellcheck)

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## RIT Writing Lab

- <http://www.rit.edu/~369www/readingandwritingdept.php3>

Writing Lab Hours: Eastman 01-2358

<b>Monday</b>	9:30 am to 12:00 n 1:00 pm to 4:00 pm
<b>Tuesday</b>	9:30 am to 12:00 n 1:00 pm to 7:00 pm
<b>Wednesday</b>	9:30 am to 12:00 n 1:00 pm to 7:00 pm
<b>Thursday</b>	9:30 am to 12:00 n 1:00 pm to 7:00 pm
<b>Friday</b>	9:30 am to 12:00 n

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## Positron Emission Tomography

- Combine Nuclear Medicine (Gamma Camera) + Computed Tomography
- Could not be done until computers and capability to make measurements of extremely short time intervals (picoseconds)
  - 1 picosecond =  $10^{-3}$  (0.001) nanosecond =  $10^{-6}$  (0.000001) microsecond =  $10^{-12}$  s
- Radionuclides ("radioactive atomic nuclei")

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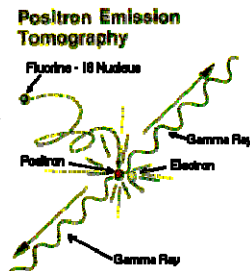
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## Positron Emission Tomography (PET)

- Positron: subatomic particle produced when radioactive material decays
  - electron mass but "+" charge
  - "antielectron"
- Positron travels a short distance away from the radioactive decay
- Positron annihilated



Triumph, Canada

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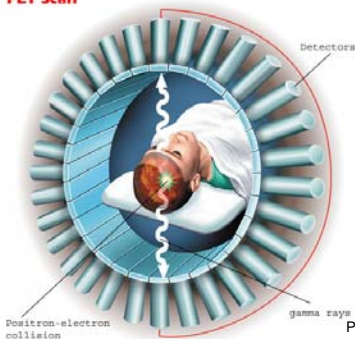
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## PET PET Scan



Popular Mechanics, 2002

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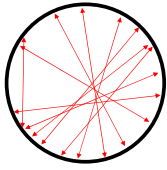
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## Schematic of PET Calculation



- Radioactive decay known to have occurred along a line
- Sum of the lines gives "estimate" of position of decay
  - Analogous to blurry image from CT "backprojection"
- Must "sharpen" the signal using a differencing filter (exactly as in CT)

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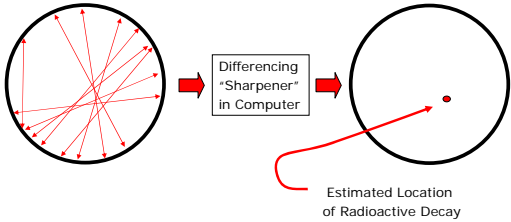
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## Schematic of PET Calculation



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## PET

- Patient injected with mildly radioactive "sugar" fluid about 30 minutes before PET scan
- Sugar is metabolized ("digested") by cancerous cells more than by normal cells
- Radioactive decay of element "attached" to sugar
  - Positions of decays measured by PET scan
- PET images "function" rather than "structure"
  - where stimulus affects brain activity

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PET

Triumpf, Canada

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Ultrasound Imaging

- Imaging by sound waves
  - Just like SONAR
- Many of same principles applied to RADAR
  - phased arrays
  - Doppler
  - synthetic apertures

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Ultrasound Imaging

- Sound is due to traveling variations of air pressure
  - involves mechanical motion in medium
  - Pressure variation causes particles in medium to vibrate due to variation in medium density
- Oscillation frequency of "ultrasound" is higher than humans can hear

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