

2010 March 27

Saturday, March 27, 2010
8:52 AM

Executive Meeting

Present: Tom Vining, Ann Hammersly, Karie Meyer, Bob Culbertson, David Weaver, Buzz Delinger, John Griffith, Darya Marakova

There are some Meister Book Award nominations this year

Asked for volunteers for the nominations committee - duty to find people to run
David Weaver, Bob C, Karie M

Current balance \$1641, current textbooks around \$200, recommend 2 awards at \$150 each

Ask companies to sponsor award in the future; Tom will ask SRP, Karie will contact Raytheon, Ann will contact Glencoe; also Vernier

Tom suggests a summer program (couple of days) on using machine shop at ASU to build demonstration/lab apparatus - we could offer a discount for members if AZ AAPT sponsors it - agreement to pursue

Karie has provided door prizes (3 books) for today's meeting - thank you Karie!

Ideas for Fall meeting - September 25 at ASU - Bob suggests possible speaker on physics of cancer (Paul Davies - also could discuss origins institute); Lawrence Krauss on physics of Star Trek - other possibilities include a make-and-take, focus a share-a-thon on optics or electricity, VPython

Ideas for Spring meeting - March 26, 2011 - Tucson - solar energy, mirror lab tour, "map room" in planetary lab

Business meeting - 18 in attendance

Arnold G. Meister book award nominees - Ann Hammersly nominated Andrej Simeunovic from Chaparral High School; Ryan Hill nominated Cole Mathis from Desert Mountain High School; Moved and seconded to give two book awards at \$150 each; motion passed

Treasurer report - current balance \$1641, only real expenditures are the book awards, Buzz collects dues of \$10 per year or \$100 for a lifetime membership; we also have books by Al Bartlett for \$10

Information on Fall and Spring meetings above

AAPT summer meeting in Portland, meeting for two-year college instructors the day before. Summer meetings tend to be more affordable since there is a dorm option generally available

Report that Howard Voss is hospitalized, very ill

Special speaker - Steve Atkins, research engineer, Sustainable Energy Solutions Steve.Atkins@nau.edu

The Power of Wind

Wind turbines convert energy of the shaft and create electricity

Total US energy production about 1 Terawatt

To determine if an area is good for wind power generation, you have to measure it - models are currently insufficient

Wind power class is determined by average wind speeds - class 4 and above usually considered good economically (approx 16 mph winds)

Higher towers experience higher wind speeds, but the amount of wind shear varies, so it must be measured for a specific location

AZ doesn't have particularly good wind speeds, but there are some locations that would be okay, especially with taller towers (100m), winds peak in afternoon and in Spring (NREL data), so this is not optimal to run air conditioners in AZ - hence APS is not a fan of wind turbines

Utilities usually don't OWN the wind farm, they bid on the energy purchase from a wind developer

Map shown of AZ power plants, transmission lines, renewable projects in the queue

Wind power: $P = 1/2 \rho AV^3$ A = area of blade sweep, V is speed of wind, ρ is air density; actual power is less based on blade design, etc.

3 blade horizontal axis wind turbines are the most efficient with solid pole (birds nested in the lattice poles)

1980's 50-100 kW was typical from turbines, 1990's 300-750 kW, 2000's 1.5-2.5 MW, now hoping for 3.6 MW+

World total installed wind capacity 120,645 MW

Slides on design of turbine, synchronization to grid

Economics drives design! Wind farm economics - large upfront costs, including roads, foundations

Details of turbine design - electrical components, constant vs variable speed

Scaling shown for large turbine

Interactive wind maps at Wind.nau.edu/maps/maps.shtml

Ann Hammersly, Chaparral High School ahammersly@susd.org

Ranking tasks are part of the TIPERS (Tasks Inspired by Physics Education Research) array of activities Student and Teacher editions available of "Ranking Task Exercises in Physics." Key in Teachers edition easily found on the internet

Introductory exercise on containers of coffee and prices per kilogram. Teaches students to approach exercise in a non-physics scenario.

Emphasis should be placed on responses to "Carefully explain your reasoning" section, which should require students to carefully explain their reasoning

Topics in the book tend to emphasize mechanics

Ranking task on average speed

Important for teacher to consider how they approach negative numbers. Do they want students ranking based on magnitudes or other

Can put the teachers' edition pdf files into Word and edit documents so that the exercises match what the teacher actually does

Good for class activities and homework assignments, gets the misconceptions out before the test

Bob Culbertson presented task ranking exercises he developed on moment of inertia and charged spheres

Teachers worked in groups to develop their own ranking tasks

Final products will be posted by Ann Hammersly and available for download

Force vs time graph with varying masses, illumination ranking task, and rotational inertia about center ranking task shown