AAPM 2021
JULY 25–29 | VIRTUAL
63RD ANNUAL MEETING & EXHIBITION

CREATIVE SCIENCE. ADVANCING MEDICINE.

EC Symposium on Lessons Learned During the COVID-19 Pandemic

Silver Linings: Tools I Will Take With Me When I Leave Virtual Teaching Behind

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Germantown Academy

Pre-Recorded

25 July 2021

Disclosures: NONE

Virtual Meetings

zoom

Microsoft Teams


N
OneNote

Honors Physics 20-21 Notebook
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Periodic Table
HP Class 126 (CH 10 - Nucle...
HP Class 127 (CH 10-02 - Ra...
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Hydrogen nuclei join *(fuse)* to form helium-4 (the proton-proton cycle in the sun):

Note that the total values of **A** and **Z** are the same on both sides of the equation. This must **always** be the case!

A → ^{1}
Z → $_{1}$

$$^{1}_{1}\mathrm{H} + {}^{1}_{1}\mathrm{H} \rightarrow {}^{2}_{1}\mathrm{D} + {}^{0}_{1}\mathrm{e}^{+} + {}^{0}_{0}\nu + 0.42\,\mathrm{MeV}$$

$$^{2}_{1}\mathrm{D} + {}^{1}_{1}\mathrm{H} \rightarrow {}^{3}_{2}\mathrm{He} + \gamma + 0.42\,\mathrm{MeV}$$

$$^{3}_{2}\mathrm{He} + {}^{3}_{2}\mathrm{He} \rightarrow {}^{4}_{2}\mathrm{He} + 2\,{}^{1}_{1}\mathrm{H} + 12.86\,\mathrm{MeV}$$

Advanced Math 20-21 Notebook

Welcome
_Collaboration Space
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General Information
Handouts
Class Notes
CH 5 (Curvilinear C...
CH 6 (Vector Analys...
CH 7 (Fourier Series)
CH 12 (Legendre P...
_Teacher Only

CH 12.III (Generating Function)
Ex. 12.2
CH 12.IV: Spherical Harmonics
CH 12.VI: Method of Frobenius

Add section Add page

$\sqrt{2\pi}$

$\ell = 0, 1, 2, \ldots, \infty$

$m = -\ell, -\ell+1, \ldots, \ell-1, \ell.$

$\langle P_{\ell'}^{m}(x) | P_{\ell}^{m}(x) \rangle = \delta_{\ell\ell'}$

$\langle g_{m'}(\varphi) | g_{m}(\varphi) \rangle = \delta_{mm'}$

We then defined the Spherical Harmonics.

$$Y_{\ell m}(\theta,\varphi) = Y_{\ell}^{m}(\theta,\varphi)$$

$$= (-1)^m P_{\ell}^{m}(\cos\theta)\, g_m(\varphi)$$

or

$$Y_{\ell m}(\theta,\varphi) = (-1)^m \sqrt{\frac{2\ell+1}{4\pi}\frac{(\ell-m)!}{(\ell+m)!}}\, P_{\ell}^{m}(\cos\theta)\, e^{im\varphi}.$$

Some Important Notes about the $Y_{\ell m}$s:

1.) The $Y_{\ell m}$s form an orthonormal set:

$$\langle Y_{\ell m}(\theta,\varphi) | Y_{\ell' m'}(\theta,\varphi) \rangle = \delta_{\ell\ell'}\delta_{mm'}.$$

or

$$\int_{\theta=0}^{\pi}\int_{\varphi=0}^{2\pi} Y_{\ell m}^{*}(\theta,\varphi)\, Y_{\ell' m'}(\theta,\varphi)\, \sin\theta\, d\theta d\varphi = \delta_{\ell\ell'}\delta_{mm'}.$$

Recall: $dV = r^2 \sin\theta\, dr\, d\theta\, d\varphi$

$dA = r^2 \sin\theta\, d\theta\, d\varphi$

2.) The $Y_{\ell m}$s form a complete set for functions defined on the unit sphere.

$$f(\theta,\varphi) = \sum_{\ell=0}^{\infty}\sum_{m=-\ell}^{\ell} a_{\ell m} Y_{\ell m}(\theta,\varphi).$$ } Laplace Series

$a_{\ell m}$?

where:

$$|f(\theta,\varphi)\rangle = \sum_{\ell=0}^{\infty}\sum_{m=-\ell}^{\ell} a_{\ell m} |Y_{\ell m}(\theta,\varphi)\rangle.$$

$\delta_{\ell\ell'}\delta_{mm'}$

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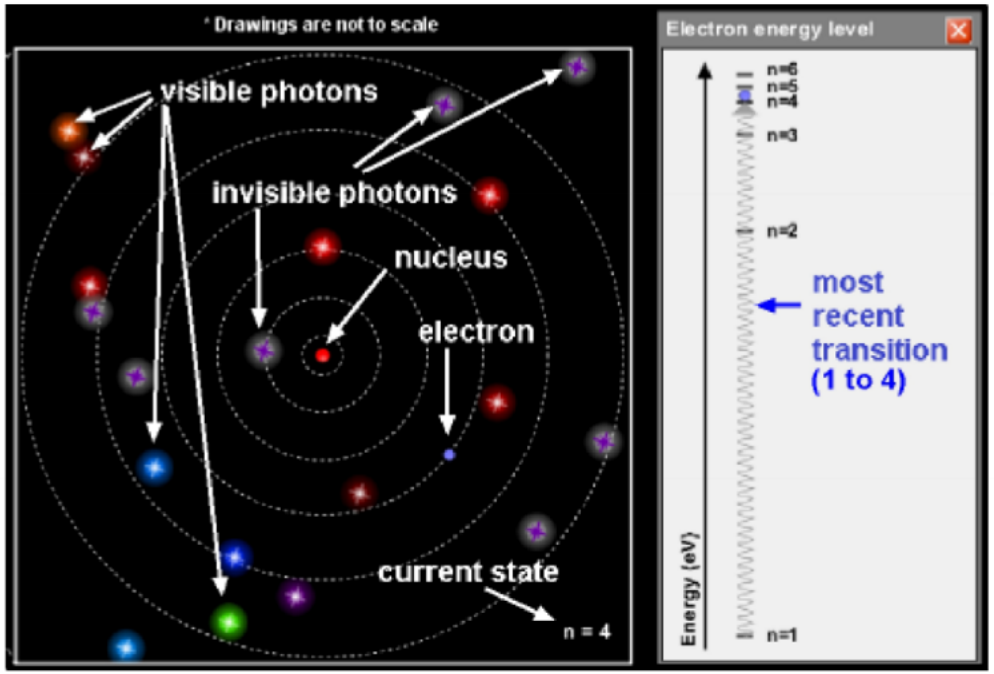
_Teacher Only
Tests
Play Space

Sample Graph 2
Sample Graph 3
HP Class 08 (Intro to Trig-I-...
HP Class 09 (Intro to Trig-II-...
Ruler + Protractor
HP Class 11 (Lab 2-Refractio...
HP Class 16 (Lab 3-Mirrors...
HP Class 23 (Lab-4 - Vector...
HP Class 24 (Lab-4 - Vector...
HP Class 26 (Lab-05-Motion)
HP Class 27 (Lab-05-Motion...
HP Class 34 (Lab-06-Acc)
HP Class 35 (Lab-06-Acc)-a...
HP Class 44 (Lab-08 Measur...
HP Class 45 (Lab-08 Meas o...
HP Class 59 (Lab-10-Circula...
HP Class 72 (Lab-11-Collisio...
HP Class 76 (Lab-12-CM-an...
HP Class 77 (Lab-12-CM-an...
HP Class 84 (Lab 14.I-Pendu...
HP Class 85 (Lab 14.II-Pend...
HP Lab-16 VGA (Standing...
HP Lab-22 VGA (Bohr Model)

Add section | Add page



7. Use the slide tab at the bottom (to the left of the pause button) to slow down the animation as much as possible. If you watch carefully, you will occasionally see an electron absorb a photon and make a transition to a higher-energy state. Then, when the electron makes a transition down to a lower level, a photon is emitted. The emitted photon travels in a random direction, whereas the incident photons from the lamp are all traveling upwards. Note that the energy-level diagram on the right keeps track of the transitions and the current state of the electron.

8. Meanwhile, the spectrometer at the lower right is keeping track of the wavelengths of the emitted photons—the spectrometer graph is basically a bar chart of the emitted photon wavelengths (in *nm*).

The Lyman Series

9. **Pause** the animation. Clear the spectrometer chart (Reset) and select **Monochromatic** in the blue **Light controls** box. Set the animation speed to **medium**.

10. Recall the Bohr energy formula $E_n = -13.6\ eV/n^2$. We spent a significant amount of time in class

From Physical Model

The slope indicates a 2.36 increase in the sin of theta for every 1 kilogram increase. The y-intercept indicates that with no mass on the string, the sin of theta is around 0.0075. It was expected that the angle of the string from the horizontal gets bigger with each increasing loading mass.

Results and Conclusions

The goal of this experiment was to analyze a system in different equilibrium states and then to create a linearization of this data. It was discovered that the more the weight of the loading mass on the horizontal string, the greater the angle created by the string. By deriving a Physical Model, it was also discovered that the sin of the angle increases by 2.36 for every 1 kilogram increase of the loading mass. This was discovered from the equation of the best fit line for the linearized data.

Biggest Problems

- forgetting to grade work
- synching issues
- administering tests


socrative

13.

For a science project, you and your group members decide to study a system involving a speed, v, and a radius, R. You take a number of v and R data pairs, all in SI units, and plot the data, finding that they do not follow a linear behavior. Knowing that it will help your score to do the best analysis of your data as possible, you decide to try to linearize the data. Applying the physics you learned, you find that v and R are related by the equation (in MKS units): $v^2 = \frac{2}{3R} - 5$. What must be the units of the "5" in this equation?

A m

B m/s

C m^2/s^2

D m/s^2

E m^3/s^2

14. A friend of yours weighs 750 N. She jumps straight up into the air. When she reaches her highest point above the ground, what is the magnitude of the force that your friend exerts on the Earth?

A 0 N

B 76.5 kg

C 130 N

D 420 N

E 750 N

15. An object of mass 5 kg is acted upon by exactly four forces, each of magnitude 10 N. Which of the following could NOT be the resulting acceleration of the object? (Hint: the forces can act in any direction.)

CH-20-1 (Fluid Dynamics)

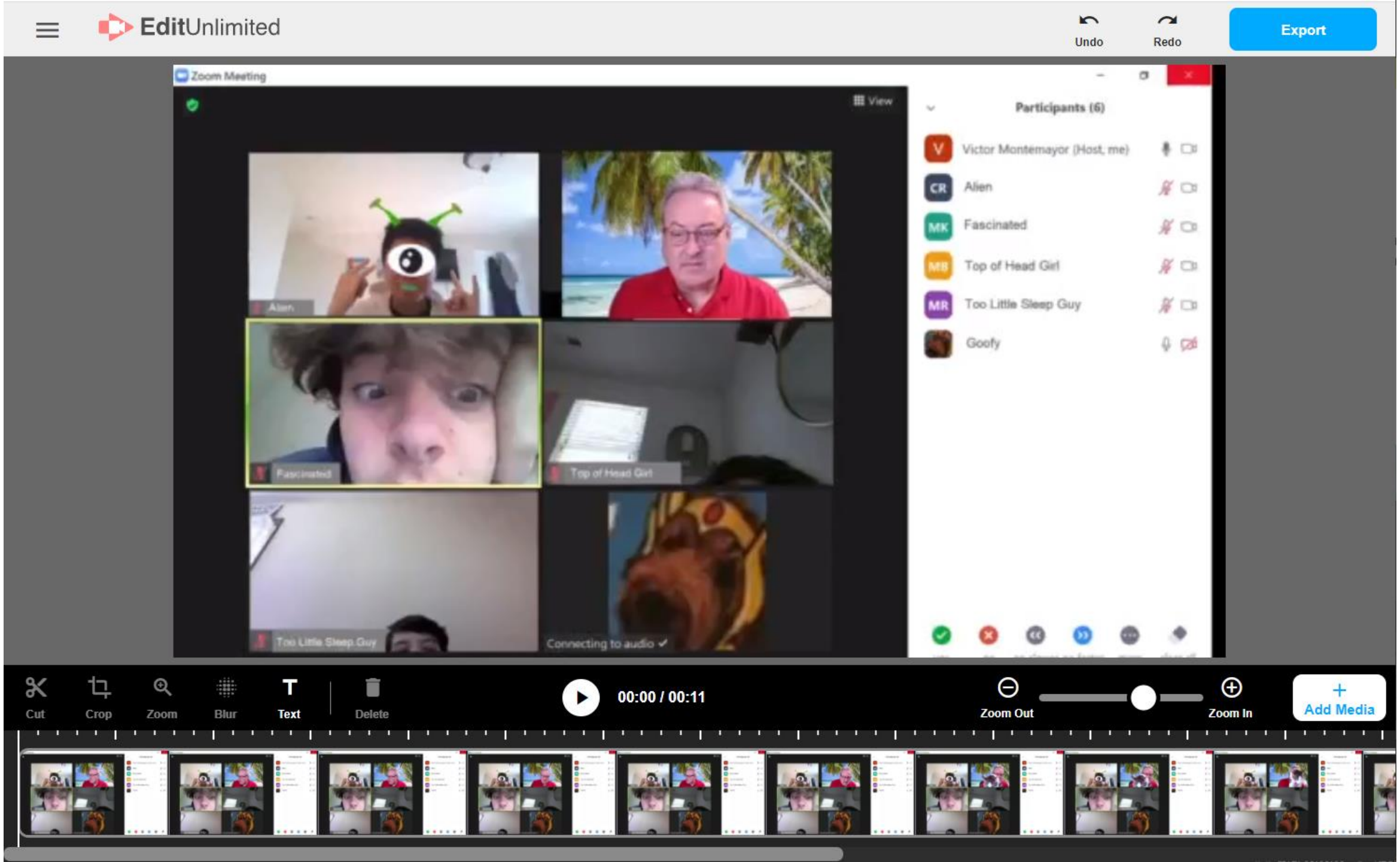
Thursday, April 15, 2021, 8:29 AM

Share Export

Show Names Show Responses Show Results

NAME	SCORE %	1	2	3	4	5	6	7
•••••••	✓ 43%	✗ E	✗ B	✓ A	✗ D	✗ D	✓ A	✓ A
•••••••	✓ 71%	✓ A	✗ B	✗ D	✓ A	✓ A	✓ A	✓ A
•••••••	✓ 100%	✓ A	✓ A	✓ A	✓ A	✓ A	✓ A	✓ A
•••••••	✓ 71%	✓ A	✓ A	✗ D	✗ C	✓ A	✓ A	✓ A
•••••••	✓ 57%	✗ E	✓ A	✗ D	✓ A	✗ B	✓ A	✓ A
•••••••	✓ 43%	✓ A	✗ D	✓ A	✗ E	✓ A	✗ C	✗ E
•••••••	✓ 86%	✓ A	✓ A	✗ E	✓ A	✓ A	✓ A	✓ A
•••••••	✓ 29%	✓ A	✗ B	✗ E	✗ C	✗ B	✓ A	✗ E
•••••••	✓ 71%	✓ A	✓ A	✗ C	✓ A	✓ A	✓ A	✗ E
•••••••	0%							
•••••••	✓ 86%	✓ A	✓ A	✗ B	✓ A	✓ A	✓ A	✓ A
•••••••	0%							
12 Class Total		80%	60%	30%	60%	70%	90%	70%


Screencastify


EditUnlimited
Undo
Redo
Export
Zoom Meeting
View
Participants (6)
Victor Montemayor (Host, me)
Alien
Fascinated
Top of Head Girl
Too Little Sleep Guy
Goofy
Connecting to audio
Cut
Crop
Zoom
Blur
Text
Delete
00:00 / 00:11
Zoom Out
Zoom In
Add Media

Open Broadcaster Software

OBS Studio 26.1.1 (64-bit, windows) - Profile: Untitled - Scenes: Untitled

File Edit View Profile Scene Collection Tools Help

Preview

Transition

Quick Transitions

Cut

Fade (300ms)

Fade to Black (300ms)

Fade to Black (300ms)

Fade to Black (300ms)

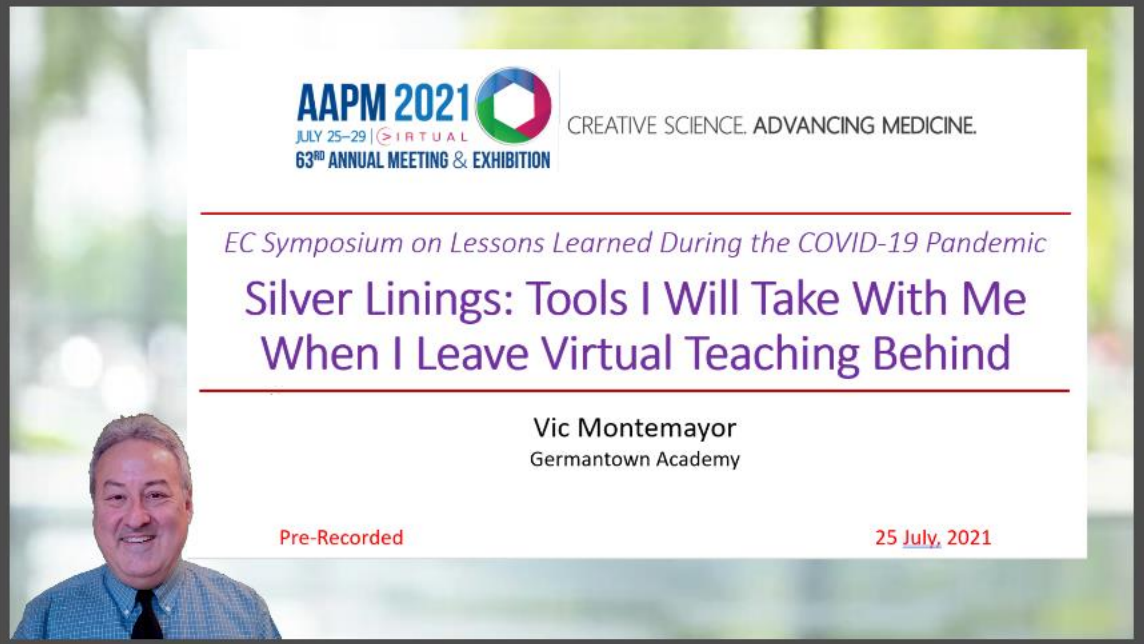
Cut

Fade (300ms)

Cut

Fade (300ms)

Program



No source selected | Properties | Filters

Scenes

PowerPoint Full Screen
Blurred Room
Blurred Room with PowerPoint
Scene
Display with Webcam
Law Office
Zoom Room

Sources

Webcam
Blurred Room Background

Audio Mixer

Desktop Audio -inf dB
Mic/Aux -4.2 dB
Webcam 0.0 dB

Scene Transitions

Fade
Duration 300 ms

Controls

Start Streaming
Start Recording
Start Virtual Camera
Studio Mode
Settings
Exit

LIVE: 00:00:00 REC: 00:00:00 CPU: 16.3%, 30.00 fps

1. Microsoft Office Suite

   Microsoft **Teams** can be downloaded from the web:
   https://www.microsoft.com/en-us/microsoft-teams/download-app#desktopAppDownloadregion
   Microsoft **OneNote** is part of the Suite. (You can create a class notebook in OneNote through Teams.)
   * You must have access to a tablet in order to use the OneNote class notebook effectively. Relatively inexpensive good-sized tablets (around $40) can be purchased on Amazon.

2. Socrative

   https://www.socrative.com/
   The basic level is free. The Pro level for higher ed costs $100/yr.

3. Screencastify

   https://www.screencastify.com/
   Screencastify is a free screen recorder for Chrome. The free version limits video lengths to 5 minutes. The unlimited version costs $49/yr (educational discounts are available).

4. OBS Studio (Open Broadcaster Software)

   https://obsproject.com/download Free download; open-source software for streaming and recording.

Good Tutorials for OBS Studio:

Complete OBS Tutorial for Teachers, Trainers, and Video-makers
https://youtu.be/wO2gswOEVAQ

How to Use OBS Studio - Complete Tutorial for Beginners!
https://youtu.be/-puA85ciDEM


Thanks!