Visualization of Radiation from Moving Charge

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Simulation code : Radiation 2D downladable from (600kB)

http:// C-band.kek.jp

Call "Name"

Orignal Version : BASIC 1984 (T. Shintake, Not published)

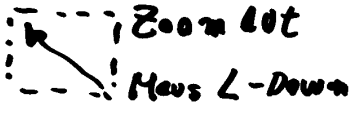
Bugs ! • change Model Size → Need Trajectory Setup

Error U>1

•

Ver!

Soon. Help File · Not available Zoom in



Field Calculation Architecture

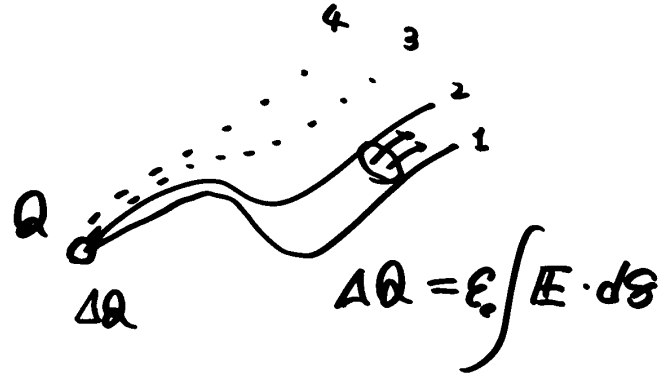
This is not Retarded Potential solver.

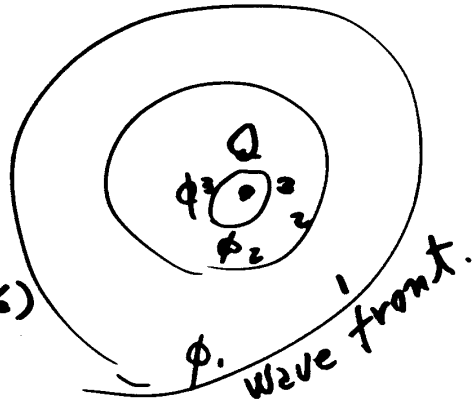
Conservation law
- Q : charge
- phase

relativity

$$(\nabla^2 - \frac{\partial^2}{c^2 \partial t^2})\Psi = 0$$

$$\Psi = \frac{1}{R} e^{j(\omega t - k)}$$

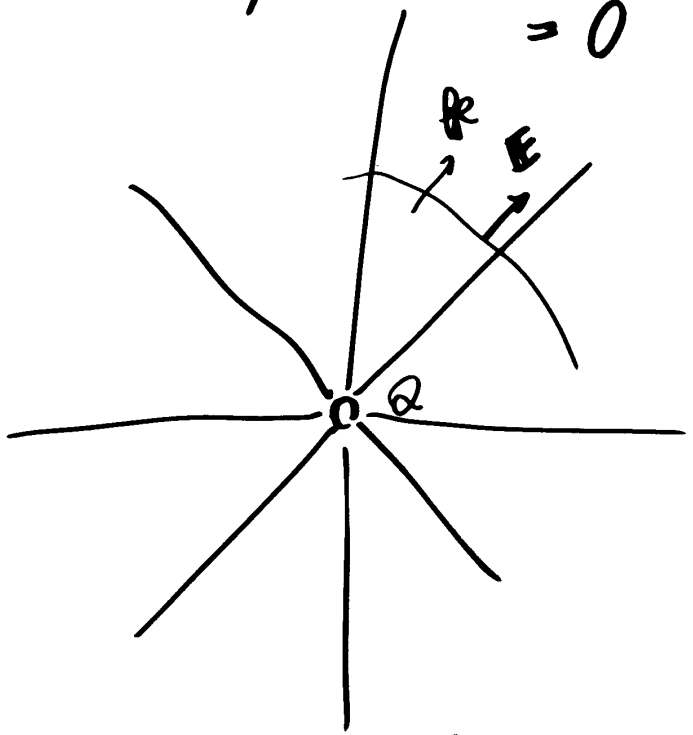




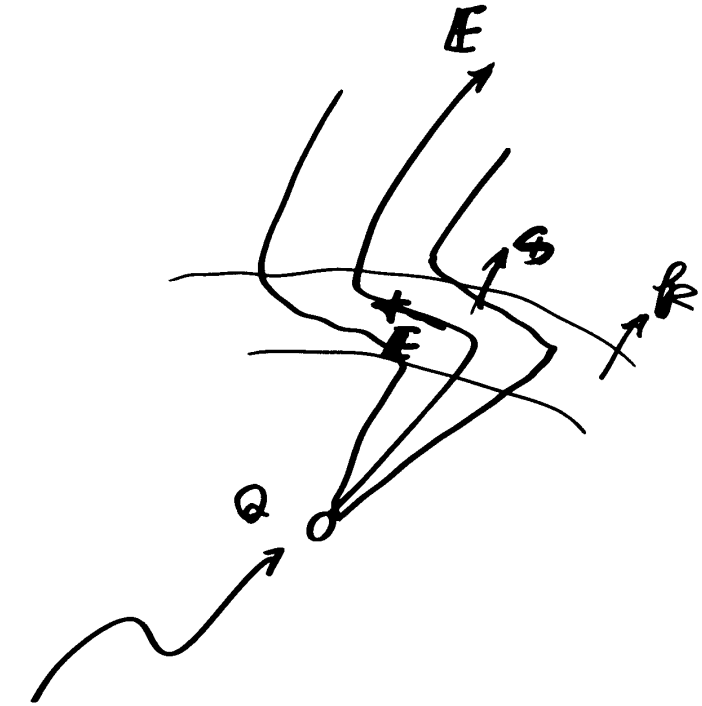
From Grid to Field.

Energy Flow $\mathbf{S} = \mathbf{E} \times \mathbf{B}$

$= 0$



Stopped Charge.



Moving charge

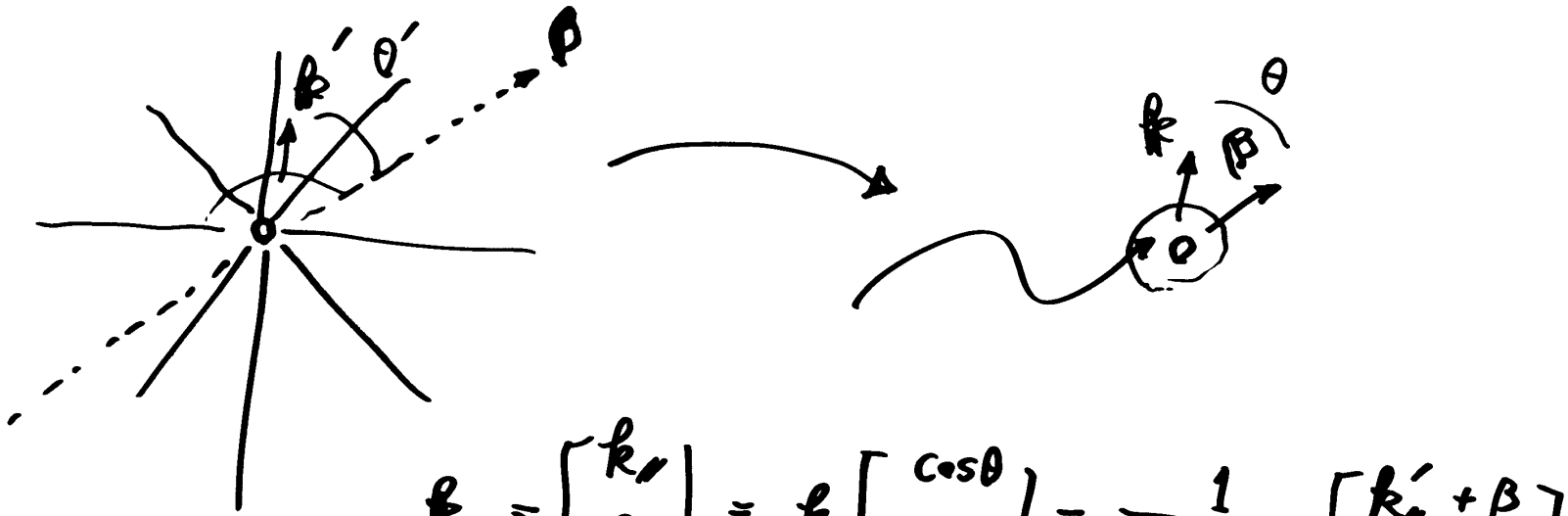
$\mathbf{S} = \mathbf{E} \times \mathbf{B} = k \cdot E_\perp \times B_\perp$

$= \frac{k}{C} \cdot E_\perp^2$

Light Abberatio (Wave-direction initial)

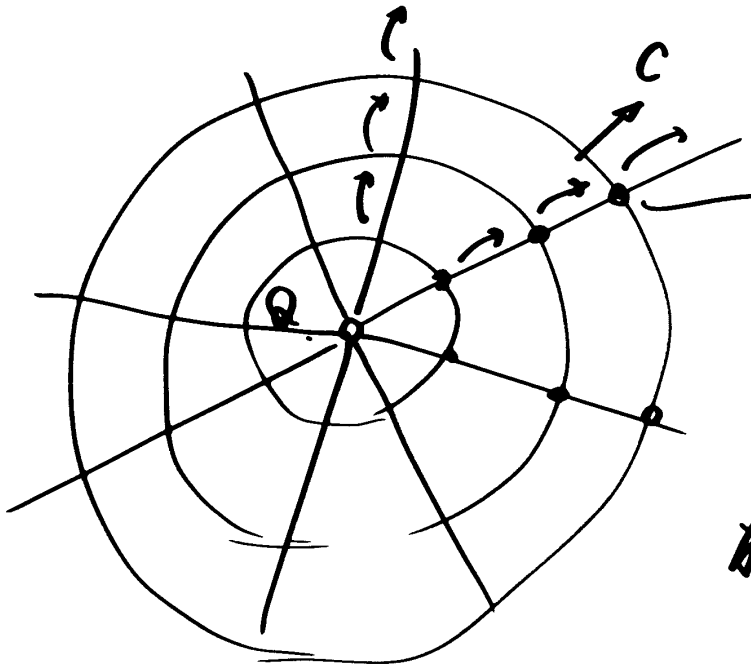
Electron Rest Frame

Laboratory Frame.



$$k = \begin{bmatrix} k_\parallel \\ k_\perp \end{bmatrix} = k \begin{bmatrix} \cos\theta \\ \sin\theta \end{bmatrix} = \frac{1}{1+\beta k'_\parallel} \begin{bmatrix} k'_\parallel + \beta \\ \frac{k'_\perp}{\gamma} \end{bmatrix}$$

Information Grid.



$$P[I,J]_{x}^{y} = P[I-1,J]_{x}^{y} + c\,dt \cdot \mathbf{k}[I-1,J]_{x}^{y}$$

$\mathbf{k}$: wave vector (direction)

$|\mathbf{k}| = 1$

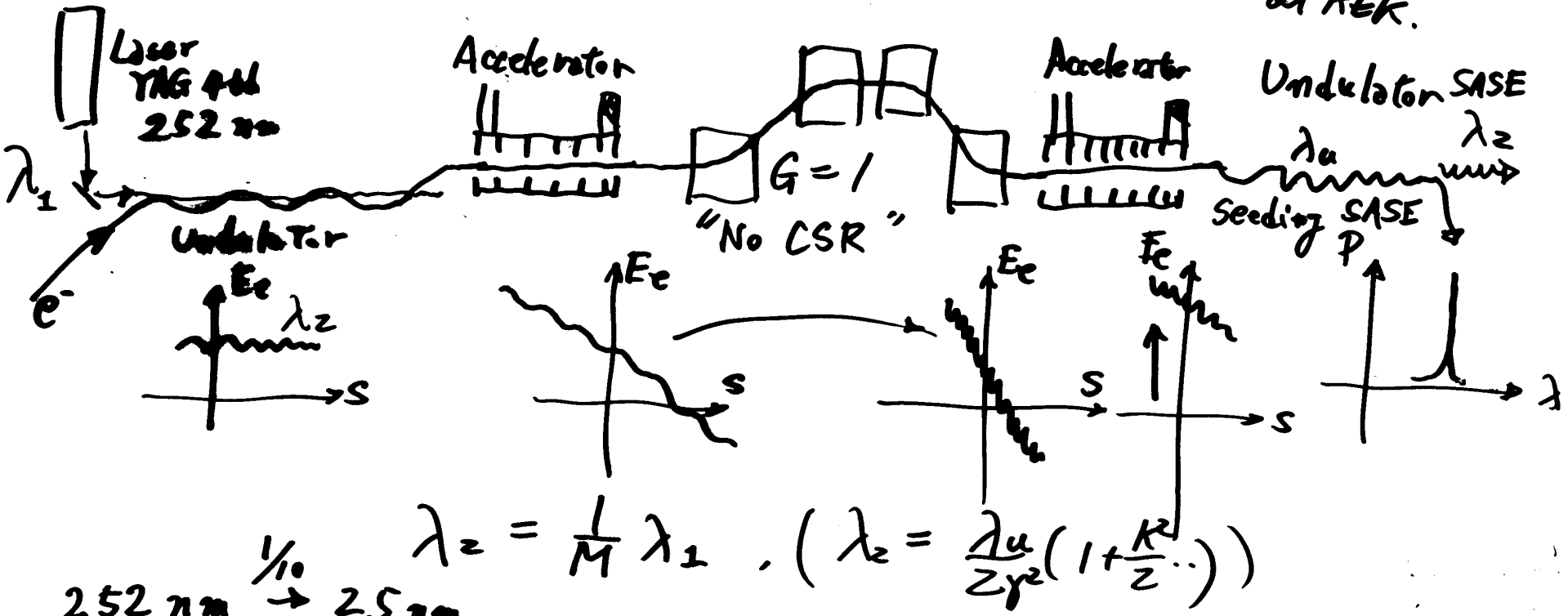
Wavelength Compressor

Seeding SASE

2002. 01. 17

T. Shintake
KEK / RIKEN

- Proposed at "High Brightness Beam Workshop", 2000, March at KEK.



$$\lambda_z = \frac{1}{M}\lambda_1 \quad \left(\lambda_z = \frac{\lambda_u}{2\gamma^2}\left(1+\frac{K^2}{2}..\right)\right)$$

1/10

252 nm → 25 nm. ...

* ? Small modulation can survive in Chicane? No....

2002/01/17.

Wavelength Compressor ver. 2002. at CSR-Workshop!

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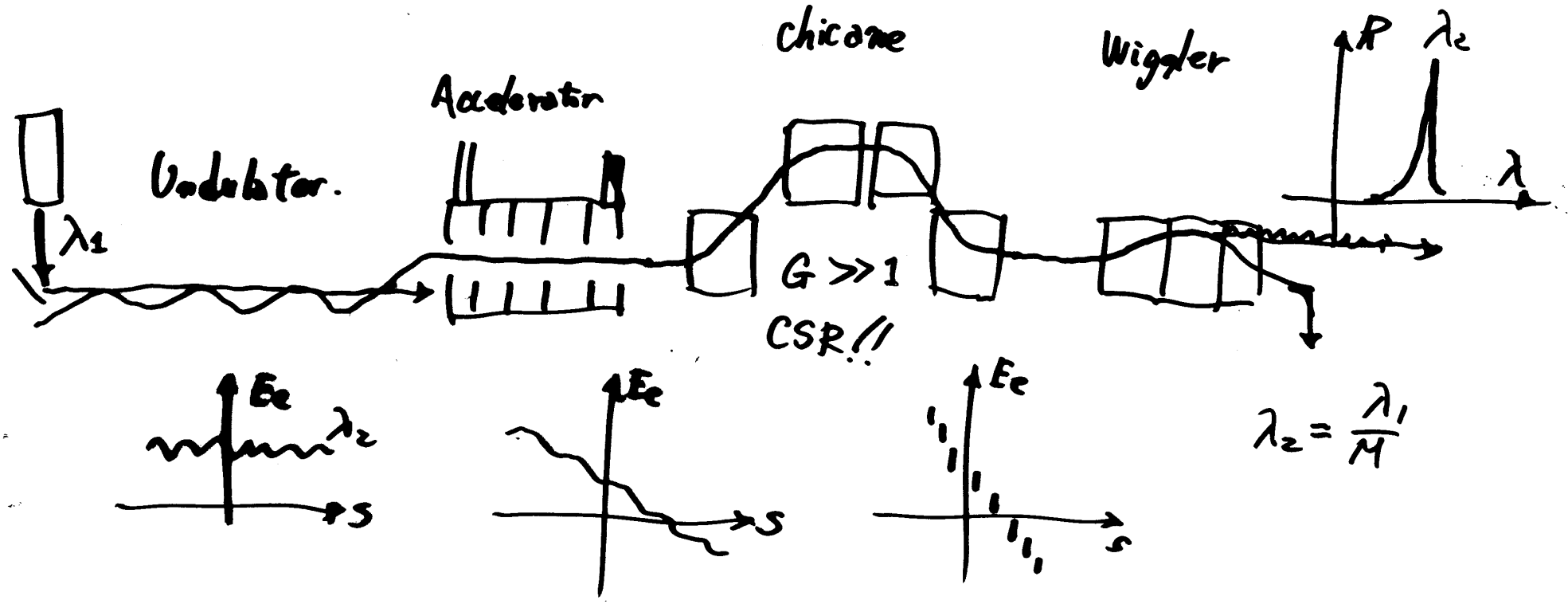

CSR Workshop supports "Modulation will alive", and Amplified!

c. i Coherent Bremsstrahlung. FEL !?

2002/01/17.
T. Shintake.