```
/
├── bin
├── home.dir
    └── jeancome
```

Chen-Zhu Xie 谢尘竹

Portfolio:

Scholar: Γ Γ

Preference:

Contact: ✉ 𝕏

Personality: aries INTP ab

Education

Nanjing University   **College** of Engineering and Applied Sciences   **Nanjing, Jiangsu**

Doctor of Philosophy	*Optical Engineering*	*Q.E. – Top 15%* ▶	Nonlinear Fourier Optics ◯	– 2025.06

Dissertation: "Analytic 3D vector linear non-uniform & nonlinear Fourier crystal optics in arbitrary $\bar{\bar{\varepsilon}}, \bar{\bar{\chi}}$ dielectrics" ◯

Master's Studies	*Quantum Electronics*	*Courses Score – 93.5* ◯	THz OAM Source ◯	– 2022.06

Northeastern University   **School** of Physics, **College** of Science   **Shenyang, Liaoning**

Bachelor of Science	*Applied Physics*	*GPA Rank – 1/400* ◯	DDTank Aimbots ▶	– 2020.06

Thesis: "Research & design of nonlinear holography based on lithium niobate 3D nonlinear photonic crystal" ▶ ◯

Freshman in College	*Science*	*Sichuan Prov. – Top 2%*	3 e-books with C++ ◯	2016.09 –

Personal Projects

Behind NLAST   **Solving** $\left[(\nabla \times)^2 - k_0^2 \bar{\bar{\varepsilon}} \cdot \right] E(r) = k_0^2 \bar{\bar{\chi}} : \mathcal{F}_\omega^{-1} \left[\widetilde{E}_\mathrm{p} \widetilde{E}_\mathrm{p} \right](r)$ **analytically**   2023.05 –

- The first & fastest white box solver ever for this inhomogeneous wave equation
  - or other similar equations, with unprecedented efficiency-accuracy product
- No competitors for the time being: other methods or software including
  - k-space RK4, pseudo-spectral, SSF, Green's Function methods, FDTD, COMSOL…
- Reproduced well-known papers, all of which provide either zero or wrong theory:
  - Nat.Photo. #proven theoratically wrong by this project #femtosecond pump
  - O.E. #Bloembergen's legacy2 #experiment | O.M.E. #z-component
  - O.E. | Q.E. #high N.A. #$\bar{\bar{\chi}}$ anisotropy   PPT 1 2 3 … ◯

DDTank Aimbots
Fourier Crystal Optics   **Analytic solution** $E(r)$ to $\left[(\nabla \times)^2 - k_0^2 \bar{\bar{\varepsilon}} \cdot \right] E(r) = 0$ **where** $\varepsilon_{ij} \in \mathbb{C}$ 2023.02 –

- Drawing insights from PRS.A. #M.V.Berry's legacy | A.O.P. | A.P.B. | J.QSRT.
- The next generation of this project will come really close to the exact solution
- Reproduced well-known papers, some are purely experimental (too hard to model):
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  - JOSA.A. | O.E. #tightly focus #$\bar{\bar{\varepsilon}}$ anisotropy | Light.Sci.App. | O.E.   PPT 1 2 3 … ◯

Real Scalar Nonlinear
Fourier Crystal Optics   **Closed-form** $E_3(r)$ in $\left[\nabla^2 + k_3^2 \right] E_3(r) = -k_{03}^2 \chi(r) E_1(r) E_2(r)$ 2022.02 –

- Solving this multivariable/field nonlinear convolution equation on my own
- Strong alternative to Green's Function, pseudo-spectral, split-step Fourier methods
- Reproduced well-known papers & models with maximum accuracy & efficiency:
  - P.R.L. #Green | P.R.L. #experiment #quantum | P.R.L. #experiment #scatter | P.R.L.
  - L.P.R. #SSF #quantum | Matlab #RCWA | A.P.L. #femtosecond pump
  - O.L. | P.R.A.   PPT 1 2 3 4 … ◯

[-1] J. Guo, Y. Zhang, H. Ye, L. Wang, P. Chen, D. Mao, **C. Xie**, Z. Chen, X. Wu, M. Xiao, and Y. Zhang, *Spatially Structured-Mode Multiplexing Holography for High-Capacity Security Encryption*, ACS Photonics **10**, 757–763 (2023)

ACADEMIC FOCUS

	Next generation high N.A. 3D vector non-uniform analytic linear & nonlinear Fourier crystal optics ⊙	2024.06 –
!Paraxial k_0^ω	**High N.A.** 3D vector non-uniform analytic linear & nonlinear Fourier crystal optics ⊙	2024.03 –
Emphasizing G_{xyz}^ω	**3D** vector non-uniform analytic linear & nonlinear Fourier crystal optics ⊙	2023.12 –
Involving $\bar{\bar{\chi}}_\omega^{(2)}$ anisotropy	**Vector** non-uniform analytic linear & nonlinear Fourier crystal optics ⊙	2023.06 –
!Unitary $G_\omega^\pm \Leftarrow$!Hermitian $\bar{\bar{\varepsilon}}_{\mathrm{r}}^\omega \Rightarrow$	**Non-uniform** analytic linear & nonlinear Fourier crystal optics ⊙	2023.03 –
Solution $E_\omega^\pm$ to $\left(\nabla^2 + k_{\omega\pm}^2\right)E_\omega^\pm \propto P_{\omega\pm}^{(2)}$	**Analytic** linear & nonlinear Fourier crystal optics ⊙	2022.09 –
Solution $\mathcal{F}\left[E_3\right] = \mathcal{F}\left[f\left(\mathcal{F}^{-1}\left[\cdot\right]\right)\right]$ to the Eq. below	**Nonlinear** angular spectrum theory for SFG ⊙	2022.06 –
Solution $\mathcal{F}\left[E_3\right] = \iiint$ to $\left(\nabla^2 + k_3^2\right)E_3(r) \propto P_3^{(2)}(r)$	**Nonlinear** convolution solution to SFG ⊙	2022.03 –
⊙ Nonlinear THz LiNbO$_3$-based metasurface	**Quit THz project formally** | COMSOL	– 2022.01
⊙ BWOPO + THz optical parametric amplification	Mathematica | BookxNote Pro	– 2021.12
⊙ THz backward optical parametric oscillator (BWOPO)	Mathematica | VBA Excel	– 2021.11
⊙ Multi-cycle THz orbital angular momentum (OAM) source	RoamEdit | Blender	– 2021.11
⊙ Narrow-band THz OAM source via Optical Rectification (OR)	Python | Blender	– 2021.10
⊙ Electricity $\xrightarrow{\text{produce}}$ Acoustics $\xrightarrow{\text{modulate}}$ Optics	RoamEdit | VBA Excel	– 2021.07
⊙ Visible Photons $\xrightarrow{\text{SPDC}}$ THz Spectroscopy	BookxNote Pro | GeoGebra | VBA Excel	– 2021.06
⊙ Cavity Phase Matching = Sheet OPO	Paint 3D | RoamEdit | GeoGebra | VBA Excel	– 2021.05
⊙ THz Holography via Optical Rectification	Matlab | GeoGebra | VBA Excel	– 2021.01
⊙ Femtosecond laser $\xrightarrow{\text{Optical Rectification}}$ Terahertz (THz)	GeoGebra | VBA Excel	– 2020.12
⊙ Multicycle THz pulse generation by OR in LiNbO$_3$ ... crystals	VBA PowerPoinT	– 2020.10

HONORS & AWARDS

Category		Result		Rank	Institution	Date
Academia	Doctor's Qualification Exam (Oral) ▶	Excellent 🌐		*Top 15%*	Nanjing U.	2024.01
	Bachelar Thesis 🐙 & Defense ▶	Excellent 🐙		*1/90*	Northeastern U.	2020.06
Competition	Three Provinces Achievement Expo 🌐	Exhibition 🐙		*Leader*	Three Prov.	2019.10
	"Challenge Cup" Tech Competition 🌐	Grand prize 🐙		*Leader*	Liaoning Prov.	2019.06
Scholarships & Fellowships	Academic Fellowship	1st class		*¥40,000*	Nanjing U.	2020-24
	"Jinchuan" Scholarship	1st place 🐙		*¥5,000*	Northeastern U.	2019.04
	Academic Scholarship	1st place 🐙		*¥2,000*	Northeastern U.	2018.06
	Entrance Scholarship	3rd place		*¥5,000*	Leshan No.1 H.S.	2013.09
Honors & Titles	Graduation with Honor 🌐	Outstanding			Northeastern U.	2020.07
	League Member 🌐	Excellent 🐙			Northeastern U.	2019.11
	Undergraduate Student	Excellent 🐙			Northeastern U.	2018.12
Memberships	Chinese Society for Optical Engineering	Member 🐙			Nanjing U.	2021-25
	"Qian Sanqiang" Talent Class	Head 🌐			I.H.E.P. 🌐	2017-20

RESEARCH PROJECTS

3D Vector Nonlinear
Fourier Crystal Optics

Solving $\left[(\boldsymbol{\nabla}\times)^2 - k_0^2\,\bar{\bar{\boldsymbol{\varepsilon}}}\cdot\right]\boldsymbol{E}(\boldsymbol{r}) = k_0^2\,\bar{\bar{\boldsymbol{\chi}}}:\mathcal{F}_\omega^{-1}\left[\widetilde{\boldsymbol{E}}_{\mathrm{p}}\widetilde{\boldsymbol{E}}_{\mathrm{p}}\right](\boldsymbol{r})$ **analytically**   2023.05 –

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  - O.E. | Q.E. #high N.A. #$\bar{\bar{\boldsymbol{\chi}}}$ anisotropy   PPT <u>1</u> <u>2</u> <u>3</u> … 🐙

Complex Vector Linear
Fourier Crystal Optics

Analytic solution $\boldsymbol{E}(\boldsymbol{r})$ **to** $\left[(\boldsymbol{\nabla}\times)^2 - k_0^2\,\bar{\bar{\boldsymbol{\varepsilon}}}\cdot\right]\boldsymbol{E}(\boldsymbol{r}) = 0$ **where** $\varepsilon_{ij}\in\mathbb{C}$ 2023.02 –

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  - JOSA.A. | O.E. #tightly focus #$\bar{\bar{\boldsymbol{\varepsilon}}}$ anisotropy | Light.Sci.App. | O.E.   PPT <u>1</u> <u>2</u> <u>3</u> … 🐙

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  - L.P.R. #SSF #quantum | Matlab #RCWA | A.P.L. #femtosecond pump
  - O.L. | P.R.A.   PPT <u>1</u> <u>2</u> <u>3</u> <u>4</u> … 🐙

Extracurricular Activities

- Member at Some Club   2017–Current
  Detailed explanation of what you do at this club
- Member at Some Club   2016–2017
  Detailed explanation of what you do at this club
- Volunteer at Some Event   Fall 2019
  Detailed explanation of what you do in this event
- Volunteer at Some Event   Winter 2015
  Detailed explanation of what you do in this event

Skills

- **Skill Group:** List of technologies
- **Skill Group:** List of technologies
- **Skill Group:** List of technologies
- **Skill Group:** List of technologies

Languages

- **Language:** language proficiency level
- **EXAM:** details
- **Language:** language proficiency level
- **Language:** language proficiency level