Nanophotonic Modeling
Lecture 1.18: Running MIT Photonic Bands

Prof. Peter Bermel
First Bandstructure: Input

(set! num-bands 8) ; sets p, the number of bands

(set! k-points (list (vector3 0 0 0) ; Gamma
  (vector3 0.5 0 0) ; X
  (vector3 0.5 0.5 0) ; M
  (vector3 0 0 0))) ; Gamma

(set! k-points (interpolate 4 k-points)) ; creates 4 intermediate values between each pair
First Bandstructure: Input

(set! geometry (list (make cylinder
  (center 0 0 0) (radius 0.2)
  (height infinity)
  (material (make dielectric (epsilon 12))))))

(set! geometry-lattice (make lattice (size 1 1 no-size)))

(set! resolution 32)
unix% mpb sqrods.ctl

tefreqs:, k index, kx, ky, kz, kmag/2pi, band 1, band 2, band 3, band 4, band 5, band 6, band 7, band 8
...

tefreqs:, 13, 0.3, 0.3, 0, 0.424264, 0.372604, 0.540287, 0.644083, 0.81406, 0.828135, 0.890673, 1.01328, 1.1124

Gap from band 1 (0.28262331147724) to band 2 (0.419334798706834), 38.9514660888911%

Gap from band 4 (0.715673834754345) to band 5 (0.743682920649084), 3.8385522650349%
Triangular Lattice

(set! num-bands 8)

(set! geometry-lattice (make lattice (size 1 1 no-size)
  (basis1 (/ (sqrt 3) 2) 0.5)
  (basis2 (/ (sqrt 3) 2) -0.5)))

(set! geometry (list (make cylinder
  (center 0 0 0) (radius 0.2) (height infinity)
  (material (make dielectric (epsilon 12)))))

(set! k-points (list (vector3 0 0 0) ; Gamma
  (vector3 0 0.5 0) ; M
  (vector3 (/ -3) (/ 3) 0) ; K
  (vector3 0 0 0))) ; Gamma

(set! k-points (interpolate 4 k-points))

(set! resolution 32)

(run-tm (output-at-kpoint (vector3 (/ -3) (/ 3) 0)
  fix-efield-phase output-efield-z))

(run-te)